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The Sight-Saving Review

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Table of Contents

Development of the Normal Eye in Infancy and Childhood*

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OPHTHALMIC information which all pediatricians should take into consideration in the care of their patients.

ALTHOUGH the eye of the newborn child is completely differentiated into its various tissues and structures, it continues to develop throughout life. The whole physical structure at birth is about 70 per cent of the final size, and in the growth process various changes take place which have an important bearing on the functioning of the eyes.

Newborn Eye

The newborn eye is a short eye and the crystalline lens is nearly spherical. This has an important bearing on the refraction of the eye, as we shall see later. The anterior chamber appears deeper at the periphery, that is, in the angle, owing to the fact that the central part of the iris (at the pupil) is being pushed forward by the lens. The ciliary processes are small. The choroid and iris contain very little pigment. The vitreous chamber is of comparatively little depth. The medial half of the eye is less well developed than the lateral, so that the optic axis, a line passing through the centers of the cornea and lens, will strike the retina at a point between the fovea and optic disk. With development, this inequality disappears and the optic axis is displaced laterally until it reaches the fovea. The fibers of the optic nerve outside the eyeball are only partially myelinated and the process is not complete until about 10 weeks after birth. The nasal ducts of the lacrimal sac,

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which are formed by the burying of a solid epithelial strand, ordinarily canalize at birth.

During the first few years of life the eye grows rapidly, the vertical diameter growing faster, so that the globe becomes more nearly spherical, and it reaches adult size at about the age of 8 or 9 years. As the orbits enlarge, and their temporal borders separate, the eyes get farther apart. The external rectus muscles thus act to greater advantage, and the internal to less, so that the eyes tend to diverge. It is interesting to note that the disparity before mentioned, between the optic axis and the visual axis, may give the appearance of strabismus where none actually exists. So also may the flat bridge of the nose and the epicanthus which occur in infancy.

The Lens

The lens continues to grow throughout life, and in a manner that is unique with epithelial structures. The cells on the posterior wall grow out as fibers reaching to the anterior lens capsule. Growth continues by apposition, but while in other epithelial structures, such as epidermis, hair, nails, the exfoliation of the oldest cells serves to maintain a state of equilibrium, no such exfoliation is possible in the lens, which is completely shut in. In this case compensation takes place by anteroposterior compression and a diminution in volume of the oldest fibers. Thus many zones are formed, often differing from each other in refractive index. These are the various "nuclei," fetal, infantile, adolescent and adult, according to the time of their appearance, but the nomenclature is at present lacking in uniformity.

Pupil

The pupils are small at birth and usually remain so until about the end of the first year. During childhood and adolescence they are at their maximum and gradually become smaller again until the pupil of advanced age is often quite small. At any one age the size of the pupil depends to a great extent upon the state of adaptation of the retina to light. A sudden increase in illumination will bring about a contraction of the pupil until the retina adapts itself to the new intensity of illumination, when the pupil will then gradually dilate to its normal physiological size. There are so many

other factors, however, which influence the size of the pupil that it is extremely difficult to isolate one and to determine its effectiveness.

Iris

The color of the iris is always proportioned to the pigmentation of the rest of the body. Dark races have a dark iris. The color of the iris depends upon the proportion between the pigment of the posterior layer, which is always abundant, and that of the iris stroma, which varies greatly. Most children are born with a blue iris, the color being due to the appearance of the posterior pigment layer as seen through a thin iris stroma, which has little or no pigment. The color changes during the first years of life as the stroma becomes thicker. If the thickened stroma contains no pigment, the iris appears gray; with increasing amounts of stroma pigment the iris appears browner. The transformation from blue iris to brown may be confined to one sector, or one eye may be blue and the other brown, but this latter heterochromia is usually pathological. Complete lack of pigment in both iris layers occurs in albinism and the iris appears pinkish.

The vitreous gel at birth contains very fine fibrils and vascular remains of embryonic vessels, but they usually disappear within a few years. The embryonic canal of Cloquet may extend back horizontally from the retrolental space to the disk but eventually sags down into the lower part of the eye by the fourth year.

The sclera is very resilient in youth and does not lose its elasticity until after adolescence.

Ocular Refraction in Childhood

The refraction of the eye at birth is comparable to that of terrestrial mammals in the natural state; the eye is adapted for vision at long distances with but little capacity for the focussing of near objects. The excessive shortness of the newborn eye, without some compensating factor, would make the incoming rays of light focus far behind the retina and would result in a hyperopia of about 24 D. But the infant's lens in its rounded condition is highly refractive and counteracts the tendency to hyperopia by converging the incoming rays, so that the hyperopia is seldom excessive.

As the child grows, the eye elongates, carrying the retina farther back, while the lens becomes flatter and less refractive, thus focussing the incoming rays of light farther back in an attempt to keep the image on the moving retina. The effect of the elongation is usually predominant, so that there is a progressive tendency of the growing child to lose its hyperopia and become more nearly emmetropic, an ideal condition in which distant rays of light are focussed on the macula in the relaxed eye. If the focus of these rays falls short of the retina, myopia results.

This tendency to elongate seems to be most active between the ages of 6 and 16, during which time the percentage and amount of hyperopia decrease, and myopia increases. After 16 the elongation of the eyeball is generally but little marked, and in the great majority of cases it ceases altogether by 20.

If an eye, therefore, is emmetropic at birth, *i. e.*, if distant rays fall directly on the retina, it is prone to become myopic as development proceeds. For this reason we like to see an eye in infancy with so-called "hyperopic reserve" so that the final refractive condition is not myopia, but emmetropia or slight hyperopia. Hyperopia is corrected in the eye by the act of accommodation which increases the curvature of the lens and converges the overshooting rays of light so that they focus on the retina. Infants and children are blessed with a very flexible lens and a great amplitude of accommodation, which can take care not only of all ordinary amounts of hyperopia for distant vision, but which also permit exceedingly close focussing for near.

According to Fuchs, about 5 per cent of infants are born myopic, 15 per cent emmetropic, and the remainder have a hyperopia of 1–4 diopters.

Public health surveys in the United States and Great Britain show a gradual decrease in the *average* refractive error from +2.5 D. at 2 years of age to +0.75 D. at 12 years.

Age	*Average refractive error under cycloplegia*
0 to 2 years	+2.5 D.
3 to 5 "	+2.0 D.
6 to 8 "	+1.5 D.
9 to 11 "	+1.25 D.
12 + "	+0.75 D.

From the same sources, the percentage of myopia was found to increase from 1.1 per cent at 2 years of age to 10 per cent in Great Britain but only up to 7.8 per cent in the United States, by the 12th year.

	Per Cent of Hyperopia		Per Cent of Emmetropia		Per Cent of Myopia	
Age	*Great Britain*	*United States*	*Great Britain*	*United States*	*Great Britain*	*United States*
0 to 2	98.1	..	0.8	..	1.1	..
3 to 5	95.8	..	2.3	..	1.9	..
6 to 8	90.6	86.4	5.3	9.7	4.1	3.9
9 to 11	87.2	77.8	5.0	16.1	7.8	6.1
12 +	79.6	66.2	10.4	26.0	10.0	7.8

Little is known about the development of astigmatism. It is found early in life and probably, in many cases at least, is congenital. It usually shows no great tendency to change during the growth period, remaining about the same from childhood to early adult life. Astigmatism is due to differences in curvature of the meridians of the cornea or lens, thus producing a distorted image on the retina.

The question of vision and its development involves a consideration of many factors. During the first ten minutes of life, eyelid reflexes, due to the contraction of the orbicularis muscle, can be elicited by flashing a bright light before the child's eyes, whether his lids are open or closed. But the same response cannot be elicited by simulating a blow on the eye with the hand or other object, which can be interpreted as superior activity of the light response or lack of experience in avoiding blows.

It is not until 10 days after birth that a small percentage (9 per cent) of infants try to converge their eyes on a small light. This is the first sure indication of fixation movements, and, we may assume, of macular function. The macula at birth is only a shallow depression and does not attain its full development until the child is 6 months old.

Difficulties in Determining Refractive Errors in Childhood

Visual acuity appears to increase with age during the early years but this should not be interpreted as an increase in pure macular function. When we ask an individual to read letters on a chart we

are testing a number of functions. To begin with, we are testing the power of attention which in itself is complex, consisting of both the willingness and the ability of the subject to make a conscious effort to read. There is little doubt that this is one of the causes of our inability at times to get the best measurement of vision in children. In addition there must be the physical ability to direct and fix the eye so that an image of each letter falls in turn on the most sensitive part of the retina. Very accurate fixation is required to read the 20/20 line, where unfortunately it has been the habit to crowd a great number of letters on the line. It is doubtful whether very young children have the necessary co-ordination of the external ocular muscles to do this. Even though the child has perfectly normal eyes, he is still a novice in their use. His coordination is instinctive—not smooth and easy. He also has poor ability to analyze form patterns.

It is important to appreciate that age and psychology must be considered in establishing a rating of visual acuity. Various surveys have been made to determine the gradual rise in visual acuity with age, but the difficulty of getting a comprehensive and representative cross-section of children's vision is apparent in the discrepancies in the published results. U. S. Public Health Service figures show a gradual rise in the percentage of children with 20/20 vision, from 72 per cent at 6 years of age to 90 per cent at 17 years. Other tables with varying figures point to the conclusion that, as Doctor Hardy so aptly expresses it, "we learn to see by seeing."

Distant vision is most accurately tested on distance charts; small type held at the reading distance, although subtending the proper angle, is not adaptable as an accurate test of visual acuity.

Binocular Vision

According to Duke-Elder, binocular vision is a late acquisition in phylogeny and in man it can be acquired only post-natally. We have seen that an early fixation reflex is present which is maintained momentarily, showing that there is an innate predominance of the macular region. This, however, applies to each eye separately, and it is not until the age of 5 or 6 weeks that an infant will fix a light binocularly. For some time thereafter, however, the power of fusion is so feebly developed that frequent lapses from parallelism

of the eyes occur, and deviation occurs on the slightest excuse; but at 5 or 6 months, fixation begins to be maintained in spite of obstacles. Towards the end of the first year the eyes will make a considerable effort in the interest of fusion, and if the obstacle proves insuperable, diplopia probably results.

It has been assumed that there is a center in the brain where this fusion is brought about, just as one might speak of the center for speech or hand movements, etc. There is no anatomical or physiological evidence, however, that such a center exists apart from the visual cortex in the occipital lobe. Adler believes that what evidence there is seems to point to the establishment of this faculty in its fullest attainable form at birth, and questions the evidence of its growth by exercise. On the other hand, Duke-Elder says that the faculty of binocular vision is acquired, like that of all other habits, by a facilitation of reflex paths, such as is exemplified in the conditioned reflexes of Pavlov. It is thus built up upon an already existent basis by education, a circumstance which accounts for the varying degrees to which fusion may be developed in different individuals and improved in all individuals. This is a moot question; the probabilities would seem to be that fusion exists potentially at birth, that different individuals have different capacities for improvement, depending upon exercise and experience, just as different individuals can develop their appreciation of and ability in art and music, but cannot go beyond their own limitations.

Although in binocular vision the two eyes act as one centrally situated cyclopean eye, the habit becomes inbred in most individuals of relying to a greater extent upon one eye than the other. One of the two assumes the rôle of the master eye. When the two eyes are approximately equal in visual acuity there may be little evidence of dominance, but it may be demonstrated in some degree with suitably applied tests. The significance of ocular dominance is not by any means understood. The common statement that right ocular dominance goes with right-handedness has no foundation in fact although a certain tendency to this exists. Adults and children show similar proportions and these are maintained in races as widely different as Chinese and Americans. Little or no indication is available as to when the preference for one eye first shows itself in development or whether the habit is established as a result

of environmental conditions or tendencies of motor co-ordination, but all the evidence points to the fact that once established it can only with difficulty be reversed.

Evolutionary Development of the Eye

Considered from the evolutionary standpoint purely as an optical instrument, the human eye leaves a certain amount to be desired. Although it occupies a high place in mammalia because of its specialized area of acute vision, the fovea centralis, and its more adaptable refractive system, it is, however, not far removed from what one might call the basal type of vertebrate eye.

In birds and in carnivores we have an eye that is more nearly perfect as a percipient apparatus. One cannot, therefore, look upon the human eye as having played a great part in the evolution of man, but one must consider it rather as a fairly simple organ rendered extremely valuable, not by any degrees of structural specialization, but by the cerebral structures with which it is connected.

The Psychological Touch in Straightening Cross-Eyes

Meta Rosenthal

IN the treatment of cross-eyes, the parents and teachers as well as the oculist are responsible for preventing psychological complexes.

The Story of Fred

"Hello, doc! We've decided to let you operate."

"Operate? What do you mean? I haven't suggested an operation," answered Dr. X, looking at Mr. Smith in amazement as the latter walked into his office hurling the abrupt announcement into the air.

"I know you haven't, doc, but you did say you operate on cross-eyes when they're too bad to be straightened by exercises, so why shouldn't it be all the easier when they aren't so bad? The boy won't wear his patch unless his mother nags him, and that gets her all excited and nervous, and she says she's too busy to stay around and see that he does it—you know how it is with a woman: household duties, aggravation with the servants, entertaining—besides, on the level, doc, don't yo' think the treatments are the bunk, anyhow? I haven't seen much improvement since the kid's been coming here. And they mount up into money, too, so why not just operate and have it over with? Speed, doc, speed! We're living in the 20th century, you know."

Mr. Smith must have caught a dangerous gleam in the blue eyes of the red-haired oculist, for he stepped back from the window to which they had walked, on the twelfth floor of the building in which Dr. X's office was located.

"Aw, doc, look, I didn't mean any offense. Truth is, I'm trying to get away from that everlasting wrangling at home. My wife

says the boy's old enough to come in from play of his own accord and cover his eye. The boy promises before he goes to school, and in the afternoon, when he's playing with the rest of the kids, he forgets all about it, and by the time I get home, the war's on. It's been that way ever since we brought him down here. Can't you see, doc, what I'm up against?" Mr. Smith let out an expressive "WHEW!" and flopped his large frame into a chair.

Dr. X did see. And although the request from the father was extreme—to perform on his son an operation which wasn't indicated—the domestic situation, unfortunately, was not an unusual one.

About six months previous to the above discussion Fred, Jr., at the age of twelve, had been brought to see Dr. X. An eye examination revealed that he was astigmatic; and that the vision in his two eyes was unequal, with considerably less than normal sight in the right eye, which also had a decided "squint." The oculist impressed upon the parents (or thought he had) their good fortune in that Fred's eyes, for which glasses and developmental exercises should have been prescribed at a much earlier age, could still be straightened and the sight developed, without resorting to an operation.

The boy took delightedly to glasses, and came to the oculist's office for prism and other kinds of exercises. At home each day, for a prescribed period of time, he was expected to wear a patch or opaque lens over the eye that had the good vision, so that the "poor eye" would be forced to function. Otherwise, in order to avoid double vision, he would suppress the image in that eye which, from lack of exercise, would in time become a blind eye—at least as far as serviceable vision was concerned. Dr. X stressed, also, the fact that an adolescent boy is naturally restless and impatient, and urged that either parent occasionally join in the task or play assigned for such hours. He cautioned, specifically, against expecting Fred, Jr., to wear the patch at school where he would encounter brutal teasing from savage young schoolmates. This, however, was exactly what his mother did expect, since it would relieve her of responsibility. Consequently, every evening upon Mr. Smith's arrival home, nagging, scolding, arguing, were in full swing and an operation seemed the only means of escape.

Resenting the reference to fees by a wealthy man whose financial status had not been taken advantage of; the thwarting of his professional skill to accomplish results despite the handicap of Fred, Jr.'s, age; and, above all, the danger of physical hazards to the boy and future mental inhibitions, which his experience had taught him to anticipate, Dr. X expressed himself in no uncertain terms. It terminated both the discussion and Fred, Jr.'s, visits to the office—and as far as the office was concerned, he was completely lost track of for nine years. Then, one morning, a tall, manly looking chap called to see Dr. X. The latter looked at him—there was a moment's hesitation—and the tell-tale eye effected the recognition. Fred flushed painfully.

There was a genuine get-together and then came the story—so tragic and so like most stories of its kind, varying only in details. The unpleasant scene which developed between his parents after Dr. X had refused to operate resulted in complete neglect of the boy's eyes; and the turned-in eye, which previously had been only a source of annoyance, henceforth became the nucleus of an ever-widening circle of psychic conflicts. A naturally sociable and normal boy began to shrink painfully within himself, which carried over into his college life. In his senior year he fell in love with a pretty co-ed, but hadn't the courage to believe that her apparently reciprocal interest was other than a sympathetic one because of his "disfigurement." There followed weeks of bitter introspection—then, suddenly, a flash of hope. Dr. X—an operation—if only it weren't too late!

It was too late—as far as the ability to restore sight to the eye, now practically blind. Cosmetically, the operation was a triumph. Psychologically—it meant years of determined re-education of the mind and will to overcome a distorted self-consciousness.

The Story of Mary Ann

Mary Ann's lithe little figure, sparkling blue eyes, and blonde bobbing curls would all dance into the room together—for Mary Ann never walked. Hat and coat pulled off and thrown unconcernedly on the nearest chair, she'd make straight for Dr. X, who usually sat at his desk awaiting the entrance of his patients. Taking hold of his hand, she'd burst into an account of her latest

experience, which she always relived, vividly, in the telling; and young as she was, she possessed a magnetic persuasiveness that swept you right into her mood. Her blue eyes would grow bluer and bluer, and open wider and wider, and then, suddenly, the left eye would turn in so sharply and unexpectedly that to one who witnessed it for the first time it appeared as though something had snapped in the orbit. Invariably, the muscular contraction was a shock to the child as well as to the observer. She'd stop short in her story; over her little face there'd slowly creep a flush of embarrassment and humiliation, and in a moment she was transformed into a self-conscious, listless child, who went through examination and exercises without a word. Within an hour she'd forget all about it, of course, and be on her way, sunny and sparkling as ever. That was Mary Ann at six.

The following year her family moved to another city, and soon dropped all correspondence with Dr. X.

At sixteen she returned with the same suddenness that Fred, Jr., had come back the previous year, and with a heart as full of trouble. Her mother, although kind and companionable, had an utterly irresponsible attitude toward everything that involved regularity in time and performance. Censuring herself during the years for neglecting Mary Ann's eyes, she, nevertheless, continued to neglect them, a condition the girl thoughtlessly accepted until she was entered in a fashionable finishing school. Then—the shock!

During the weeks that followed the operation (both sight and muscles responded favorably), one sensed, despite the girl's unfailing sweetness and respectfulness toward her mother, an unmistakable attitude of rebuke which she tried desperately to hide.

Care of Cross-Eyes

However, for every case of neglected cross-eyes (strabismus) there are many cases which receive solicitous and conscientious care. The process is a tedious one, necessitating daily attention and extending, often, over a period of years. But care alone is not sufficient. It must be the right care. As soon as the cross-eyes are discovered, the child, even if still a mere baby, should be placed in the hands of an oculist. In the oculist's ability to make a scientific diagnosis of the condition of the eyes, the source of the error, and

the correct and effective manner in which to treat them, lie the safety and successful outcome of those eyes.

According to the best medical consensus, glasses are prescribed in most cases of cross-eyes. Developmental exercises are invariably a part of the program; for although the visual error may be slight, lack of muscular co-ordination between the eyes is apt to induce a child to suppress the image in the eye that has the lesser sight, in order to avoid "seeing double." If the inactive eye remains dormant too long, there is danger of permanently impaired vision in that eye—even blindness, if, as in the case of Fred, Jr., the sight is poor at the outset.

Each case of cross-eyes is individual and should be scientifically treated as such. Yet innumerable otherwise intelligent parents have been lured (although in decreasing numbers) by the "cure-all" promises of charlatans who hypnotize them with magnetic slogans such as "Throw Away Your Glasses," "Cure Cross-eyes via the Natural Way," etc.

The desire to counteract these pernicious practices undoubtedly has been one of the influences that led to the establishment of scientifically conducted orthoptic clinics. These clinics are in connection with hospitals, universities, and eye infirmaries throughout the country. Their staffs are comprised of oculists, who are assisted by "orthoptic technicians." The latter are trained in physiological optics, anatomy, refraction, psychology, and in other related subjects. Certain clinics treat only children; others admit both children and adults. In either instance the patient must have been examined by a medical member of the staff or by an outside oculist. A few of the clinics charge fees, which are dispensed with if paying them imposes a hardship on the patient or the patient's family.

Orthoptic Exercises

We are told that corrective and developmental exercises in the large majority of children's cases, if begun early enough, will straighten the eyes and develop the sight to the maximum of each child's ability to see. If, however, upon clinical examination, there is doubt as to the efficacy of exercises in a particular case, tests are made to determine whether they or an operation is required. No false hopes are held out, or dangerous formulas, like "Throw Away

Your Glasses," advocated, although there are occasional cases of cross-eyes which glasses do not help to correct. Intensive, systematic investigation is going on at the present time to determine the exact effectiveness of orthoptic exercises upon the muscles of the eyes.

Most oculists still prefer to treat their cases of cross-eyes in private practice. Whether that be the procedure or whether they send them to clinics, they are agreed that it is vitally important to prevent a sense of inferiority from creeping into the minds of their patients, which is likely to occur because of the physical handicap.

In the ideal clinic it becomes the duty of the technician to plan "homework," when recommended, in relation to a boy's or girl's favorite studies, play, hobby, or what not; the object being, of course, to transform trying minutes or hours into absorbing occupation. If the only instruction for home treatment is to cover the good eye, it is wise for the person who has charge of the child to provide an interest. It should be selected with consideration not only for the discomfort of having one's sight restricted to its minimum capacity, but for having to make the eyes function concentratedly. It is well to be understanding, particularly, during those unstable adolescent years when the days seem entirely made up of positive discipline at school, and incessant "don'ts" at home. This doesn't mean that an adult need enter into every period devoted to exercises. An engrossing occupation, an occasional word of encouragement, or hour of enthusiastic companionship, usually suffices to convert the irksome duty into pleasurable pursuit. There is bound to be occasional rebellion. An adult would not be above it.

Co-operation of the Mother

The mother—it is usually she who is called upon—who is impatient with her part of the discipline, or who is bored at the idea of entering into her child's mental world, might take heart by reading an article entitled, "You Might As Well Enjoy It." In it, the author, William Moulton Marston, says, in reference to our bored attitudes toward other people's enthusiasms, "Boredom may be the raw material of pleasure," and suggests, "Dive into the topic mentally, try to master it yourself, and you'll find your-

self enjoying it." This approach may be encouraging, also, to the boy or girl who has no inherent preference for a topic, occupation, or sport. Who knows? Many a physical handicap, and one much worse than cross-eyes, has been the means of firing the imagination to venture into unexplored channels of thought or endeavor, which have led to a stirring life's work or to a fascinating avocation.

Don't Criticize Glasses

Another suggestion to mothers is that they refrain from making disparaging comments within range of their children's hearing regarding the effect of glasses upon the latter's looks. A thoughtless remark, such as, "Glasses simply ruin Susan's looks," has been instrumental in accomplishing that very thing because it has made Susan "feel under"; whereas, accepted naturally, glasses would have heightened her expression, through providing her with comfortable or clearer vision. Besides, the point of view is old-fashioned, to which our swanky and most ultra fashion journals will testify. Just recently they have proclaimed that grimaces and nervous manifestations occasioned by strained vision are far more devastating to good looks than glasses. Surely, two bright, straight eyes, sparkling through glasses, are more flattering to a child's appearance than eyes that are out of focus.

If a boy objects to wearing glasses, let him select a frame that is similar to the kind worn by one of his heroes (provided, of course, it is mechanically correct) and his opposition will quickly melt away. An appeal to the little daughter by demonstrating that they improve her looks; the shopping tour, enlivened by creating an interest in the subject, such as is exhibited in the purchase of a dress or toy, and the trick is almost certain to be turned in favor of the glasses. In each case, they should be spectacles.

Conclusion

A diagnosis by an oculist, and faithful co-operation with him; winning the boy or girl over, through pleasurable occupation, to acceptance of the discipline, and there need be no more loss of sight because of neglected cross-eyes; no unnecessary operations; no heartaches and disillusions; and, above all, no psychological conflicts, such as developed in the cases of Fred, Jr., and Mary Ann.

Sight-Saving Classes

Professor Dr. M. Bartels

An Excerpt from the German*

Translated by Hildegard Lawler
Edited by Harry S. Gradle, M.D.

> THE similarities as well as the differences in sight-saving classes abroad and in America are brought out in this article, translated from the German.

WHEN classes for the physically handicapped are requested, one invariably receives the reply that the money could be better spent by using it exclusively for normal children. That this answer is absurd and superficial in the case of sight-saving classes, I hope to be able to prove. The omission of such classes is much more costly than their installation.

How Did Classes for Low-Visioned Children Originate?

Teachers in schools for the blind were the first to point out this need. As early as 1802, in Austria, Von Gaheis wrote:

> "By enlarging the Institute for the Blind, there could be a department for the partially blind where these children could be trained to make the best use of what eyesight they had left."

Rektor Herzog of Berlin once said:

> "To be blind always means a certain dependence. But this is not permitted to children with low vision as long as they have a fraction of sight left. These children in a school for the

* The original article by M. Bartels of Dortmund appeared in the *Klinische Monatsblaetter für Augenheilkunde*, August, 1938. A free translation was published in the *Journal of Social Ophthalmology* (Paris), November, 1938. As the latter has but a limited circulation in the United States, it was thought that a free translation of certain applicable parts of the original, published in the REVIEW, would be of interest and value to the subscribers.

> blind naturally feel themselves superior to the totally blind and constitute a disturbing element in the classroom. To be sure, they can serve as leaders. In doing this they probably lighten the work of the teacher, they help the blind children, but they do not learn to utilize the remnants of their own sight."

Teachers of the blind have also called attention to the fact that low-visioned children who graduate from a school for the blind are stigmatized as blind all their lives and naturally this hinders their advancement. It is difficult to transfer a child who has been educated in a school for the blind back to regular school work since the methods employed are so different. Instructors in schools for the blind are fully aware of this problem. Dallberg, at the Congress for the Blind in Königsberg, 1927, said that the establishment of special classes for low-visioned children would relieve the Institute for the Blind and other welfare agencies dealing exclusively with the blind.

If, on the other hand, a child with low vision is left in regular school, he is retarded, because the teacher has too many children under his supervision to give special attention to this child. Sometimes the parents can help, but in the majority of cases the child's work suffers, he develops an inferiority complex, he fails to develop mentally, he often has to repeat grades, and becomes the laughing stock of his school fellows.

Children are cruel and often make fun of those with poor eyesight. When those with low vision graduate they are inadequately equipped for life and become burdens on society. It is therefore of the greatest interest to the State to educate this group of children as adequately as possible.

We must always stress the fact that a sight-saving class is a school for normal children and that many children may be transferred back to regular schools after sight is improved, or the disease endangering their eyesight has been cured.

From the purely financial standpoint, sight-saving classes are more expensive than regular classes; but in the long run, they are a saving of money. Furthermore, sight-saving class children may be trained for many occupations from which the blind are barred. This has been proven by the graduates of schools for the low-visioned in Berlin and Dortmund. This method of education re-

duces the cost of relief and, what is very important right now, increases the number of employables.

Who Are the Partially Seeing?

An absolute definition for partially-seeing children does not exist. We do not even have such a definition for "blind." The decision as to what children qualify for this group should be fixed by the ophthalmologist and the school authorities acting together, never separately. We can accept with reservation the definitions adopted unanimously at the Congress for the Blind in Königsburg in 1927:

> "A child is practically blind and should be educated in a school for the blind whose vision is from 0 to 8/200 . . . ."
>
> "A child is partially-sighted and should be educated in a sight-saving class when he has vision from 8/200 to 20/80, provided the vision is sufficient to learn reading and writing under the safeguards which sight saving furnishes and provided it is sufficient to make practical further education for a profession or occupation followed by seeing people.
>
> "Supplementing the above we add that beside visual acuity, fields, color sense and near vision must be taken into consideration when defining this class of children."

Experience proves that children with as little as 4/200 can learn to read and write in sight-saving classes. The entire make-up of the child must be considered—his mental and physical equipment—but it must be remembered that even retarded children have made satisfactory progress once they were placed in sight-saving classes. Furthermore, the helpfulness of the parents and the family background influence these cases. In borderline cases the school should make the decision after due trial.

Besides children with reduced vision, those with endangered vision must be considered. This group includes children who suffer permanently from some pathology of the eye and who, therefore, as the English authorities have discovered, are truants from school for years. Examples of such cases are children suffering with keratitis parenchymatosa, chronic trachoma, scrofula, etc. Naturally these children, because of their long absences from school, become retarded. This group should be placed in sight-saving classes temporarily. Here in Dortmund we include the highly myopic with

those who have endangered vision. Children who, on entering school, have eight or more diopters of myopia should be referred to sight-saving classes; also, children who have lesser degress of myopia but who come from families where there is a history of myopia. With this group of children who have "endangered vision" it is not a question of visual acuity but a mechanism whereby further damage to the vision may be prevented by special instruction.

England and America go much further than we do, and in these countries children with four diopters of myopia are referred to sight-saving classes. In a recent report of the National Society for the Prevention of Blindness cases were cited where children recovering from general sickness or one-sided enucleation, or suffering with nervous asthenopia, were placed in sight-saving classes. This I consider to be superfluous. On the other hand, we should consider sending children with amblyopia due to strabismus to sight-saving classes as long as the good eye is bandaged.

We wish to mention here the regulations laid down by the Board, elected for this purpose:

"1. We hope to send back to regular schools as many as possible.

"2. The establishment of sight-saving classes is feasible only in large cities or their immediate neighborhood, and not for purely rural areas. Children from these areas may be placed as boarding pupils in sight-saving classes or in the Institute for the Blind, at the discretion of the authorities, each case being judged individually.
It is not considered advisable to put sight-saving classes in schools for the blind.

"3. Children who cannot progress in the ordinary classroom should be put in sight-saving classes. In this group we consider the following:

(a) Eye diseases.
Lower limit of visual acuity—8/200 with normal visual fields and a normal intellect.
Certain intelligent children whose visual acuity is below this limit may be exceptionally admitted, on trial, once their visual defect has been corrected.
Upper limit of visual acuity—20/80.
Mentally defective children are excluded. Children who have great difficulties in learning to read or write may be admitted with the poorly sighted.

(b) Systemic diseases (children with a threatened eyesight). The decision rests in each case with the oculist. To this group belong all cases of chronic relapsing diseases of the anterior and posterior segments of the eye. Oculists should endeavor to identify these cases among the children under their care. Eventually one may temporarily admit these cases in a sight-saving school during the active stage of the disease and send them back to the ordinary school once they are improved or cured.

(c) Refraction errors (in these cases the decision rests with the oculist).
The following belong to this group: (1) Myopia exceeding eight diopters progressive, hereditary, in children in whom an aggravation has been observed; and (2) other marked refraction errors after an estimation of the visual acuity."

How May the Partially Seeing Be Found?

This is not simple because there is great ignorance on the subject and little enthusiasm for it. The co-operation of ophthalmologists, teachers, parents, and authorities is imperative. The eyes of all school children should be examined. In Dortmund, the school board requires the teacher to submit on special forms a list of all children suffering with eye trouble. The school doctor then examines all children, paying special attention to the children on this list. His recommendations are reviewed by an ophthalmologist who does not treat the children but who states the findings and refers the children to their own ophthalmologists for treatment, refraction, etc. According to our experience, many more children are referred to sight-saving classes than really qualify; for instance, in Dortmund 500 children were listed as possible candidates but only 39 were actually eligible for placement in sight-saving classes.

It is highly necessary that a complete list of the younger children be submitted by the school doctor because early discovery and placement in sight-saving classes are important.

After the ophthalmologist decides that the child is a candidate for the sight-saving class, he sends him back to the school doctor with a regulation form properly filled out. The school doctor then examines this child for other physical or mental disturbances. Contact is made with the parents and their consent is gained for place-

ment. The child is then given a thorough pedagogical examination by the sight-saving class teachers.

Besides this, ophthalmologists generally are urged to refer to sight-saving classes children of low or endangered vision whom they discover through their private practice. Unfortunately, there is indifference at times and this militates against the interests of the children.

I have already stressed the fact that here, as in America, only mentally normal children are referred to sight-saving classes. These schools are not for the subnormal but for the normal. The sight-saving class demands more mental exertion than a class for normal children. The fact must be recognized, however, that often children of normal mentality appear subnormal because of their retardation on account of low vision, and therefore experimental placements of this group are justified.

There is justice in the demand of Herzog of Berlin that, without reference to the attitude of the parents, the placement of children who are rated as sight-saving class pupils should be compulsory in the interests of the common good.

The expression "sight-saving classes" is official in America only. In England these classes are called "schools for the partially sighted." The parents and children feel that this name removes the stigma attached to the handicap and minimizes the difficulties which might be encountered on leaving school. These classes might also be called "classes for visual re-education." However, as I said before, I believe that the term sight-saving class is the best because it implies that it is to the child's best interests to be in the class and the parents will understand this and be more co-operative.

How Many Partially-Sighted Children Are There?

There is a remarkable similarity in all civilized countries in the proportion of sight-saving class pupils to the total number of children. If we take into account only those with very low visual acuity, the proportion fluctuates between 0.3 and 1.2 to every 1,000 in all countries. If we know the total school population, one can easily estimate how many would be eligible for sight-saving classes.

As far as I know, Japan is the only country at present where an estimate has been made, by a national census, of the number of chil-

dren who are partially sighted. The total school population in Japan in 1934 was 7,366,028 and the number of low-visioned children was 9,023, or 1.22 per 1,000. It is also interesting to note that the number of low-visioned children increases with the grades. In the sixth grade there were three times as many as in the first grade.

Which of the Plans for Sight-Saving Classes is Considered Best?

There are three different kinds of classes: (1) Sight-saving classes in schools for the blind; (2) the English and American systems, where partially-sighted children are educated with normal children with the exception that certain subjects are taught under the special conditions and methods adopted for the partially sighted; and (3) the system where whole schools are given over to sight-saving class work.

Sight-saving classes in schools for the blind are certainly the worst solution, since instruction for the blind is absolutely different from instruction for the partially seeing. Low-visioned children who attend a school for the blind are stigmatized their whole life long as blind.

The Anglo-American system has the advantage of keeping the partially-seeing children with the normal child. It is supposed that inferiority complexes are avoided by this.

Our experience has been that children who attended our separate system have never developed these feelings of inferiority. It is to be noted that in both American and English classes many myopes who do not have low vision are placed in the classes, while here in Germany we have only actually low-visioned children or children with endangered vision.

A very important item is the fact that teachers must be trained. Our Dortmund teachers had a year's training in Berlin, followed by an examination. The heavy duties incidental to this work demand particularly fine qualities of personality and character, plus devotion to the cause.

What Are Results?

Remarkable results have been obtained in all countries. Children who were retarded in the ordinary school progressed fully in the sight-saving class. The children enjoy their work so much

in these classes that they are loath to return to the regular school when their sight improves.

There are sight-saving classes in North America (including Hawaii), Argentina, Belgium, Brazil, Denmark, England, Holland, Scotland, Switzerland, Hungary, Palestine, and France. Classes are contemplated in Australia, Bulgaria, Finland, Portugal, Lithuania, and Tasmania.

In pre-war Germany the first school was established in 1911 in Strasbourg. At the present time there are schools in Berlin, Dortmund, Essen, Leipzig, and in Chemnitz and Hamburg. There are schools annexed to the School for the Blind. The systems in North America and England are the best developed. In April, 1938, there were 571 sight-saving classes in the United States. In the United States these schools are recognized by law in 20 of the 48 states. In many cases state support is provided. In England and Scotland the schools are supported by government grants.

Conclusion

In conclusion these facts must be considered. Either sight-saving classes are unnecessary and, in that event, we should close the existing ones; or they are necessary, in which case they should be systematically fostered. That they are necessary and beneficial has been proved in many countries. I hope I have proved that the cost yields big dividends. There is no doubt that institutions for the blind are far costlier.

Since sight-saving classes are necessary, the disparaging of them should cease and the State should adopt a systematic course of procedure. Stupidity and ignorance must be overcome. It might be best to start first in the large cities, because they furnish better conditions for demonstration. Later the smaller cities and rural districts can be regulated.

It is curious how extraordinarily well the blind are cared for by the State, while the partially sighted are not. It is illogical to care for the blind and ignore the partially sighted. Surely the welfare of the blind should not be neglected, but it is much more important to the State to care for the partially sighted, especially since this constitutes a much larger group.

The College Student and Dormitory Study Facilities*

Anette M. Phelan, Ph.D.

EMPHASIZES the necessity for a continuous program of eye health during the college age, and presents a description of reading and study facilities conducive to good eye health.

OF THE one and one-half million students in colleges and universities today, probably the majority entered with the intention of completing the four-year course of study. Those who find satisfaction and success in college work will graduate, but others will drop out all along the way. The loss in time, money, and courage is serious. Any factor influencing the success of students merits consideration, alike by the faculty and the student body.

Good Eyesight Essential to College Education

In the present college curricula, successful achievement is largely conditioned by the student's ability to receive mental stimulation from the printed page. In college the student finds keen competition and a responsibility for self-directed study for which he is not always prepared. To secure and maintain a standing in college, he must read more than he has ever done before, and the reading must be effective. Rereading of material takes time which could be devoted to other assignments.

Good study habits are essential to college success and can be learned. Certain factors more than others influence this learning. Proper and adequate instruction in study methods, the student's desire to learn and his willingness to work, are important. No less important are the student's eyesight and his use of light as an aid to vision.

* For the Eye Health Committee of the American Student Health Association.

The college student who understands the part good vision plays in college achievement is likely to discover, before college entrance, just what the status of his vision is and how he may safeguard it. For such students, a complete eye examination by an eye physician (ophthalmologist), proper correction of refractive errors when present, and the physician's recommendations for care of the eyes, probably constitute a minimum for college work.

In all likelihood the eyes of the entering student are not fully matured, and the heavy eye load during the early years of college life may result in strain and fatigue. It is possible to reduce the amount of both strain and fatigue through a discriminating selection and use of light as an aid to vision. While light is by no means a substitute for ophthalmic supervision, its proper use is important, since the improper use of light constitutes a handicap even for the student with normal, healthy eyes. The facts on light and vision are few and relatively simple; their application to the study situation will go far toward the reduction of fatigue and discomfort.

Good Lighting an Aid to Seeing

The object of lighting is to facilitate seeing. It is not enough that the illumination be such that eyes can see the work: it should provide for a maximum of speed and a minimum of errors, fatigue, and discomfort. According to some research authorities, efficient speed and accuracy in seeing call for an intensity of not less than ten foot-candles (ten times the intensity of illumination given by a standard candle to a surface one foot distant).[1] In the practical application of research findings it is well to keep in mind the fact that laboratory tests are made under controlled conditions. In the tests on light and visual efficiency, the conditions include a test object of a given color and size, and a strong contrast in brightness between the object and its immediate background. For example, black printing on a white background provides a strong contrast in brightness, and hence is more easily read than the same printing on a colored background; and large type is more easily seen than small type. In college texts and study materials, both size of type and the color of background tend to vary. An increase of intensity of illumination on the page will increase the contrast between the printing and its background, and will also aid in discriminating the

Figure 1.—Use of the lamp in a single room. The student is right-handed, so the lamp is placed at the left and just behind the shoulder line.

Figure 2.—Position of the lamp in a double room where the lack of space necessitates the staggered use of the desk. Each student receives adequate light; the light source is so located that each is protected from glare; and a large surface of the ceiling is well lighted, thus providing good diffusion and good general illumination.

details in small type. There appears, however, to be no value in excessively high intensities.

The minimum intensity recommended in "American Recommended Practice of School Lighting," namely, 15 foot-candles, appears to be adequate for the ordinary reading done by students.[2] This intensity may also meet the needs of students with astigmatism (irregularity in the curve of the cornea or lens). Astigmatism interferes with efficient vision and contributes to discomfort and fatigue. The increase of intensity of light on the page or work reduces the influence of astigmatism.[3]

Vision for detail is improved when the general illumination is slightly below that on the page or work.[4] It should never be less than one-fifth of the page illumination. With the use of a light meter, which should be available on any college campus, the student may determine whether he is working with adequate light, and whether the relationship between the general room illumination and the desk illumination is suitable for efficient work.

Intensity is by no means the only lighting consideration, nor is it the most important. Eye comfort and eye health require suitable quality and distribution of light. For example, the quality of daylight is such that the human eye responds to it more favorably than to artificial light. This is due to the selective sensitivity of the retina to different wave lengths. For the same reason, the Mazda lamp is more comfortable for ordinary purposes than the so-called "daylight" or blue bulbs.[5]

In eye health and efficiency, distribution of light is very important. This factor deals with such considerations as glare, strong contrasts, shadows, etc. Glare has been defined as a "bright light in the wrong place."[6] The wrong place is within the field of vision. A bright light within the field of vision of the worker interferes with his visual efficiency; the brighter the light, the greater the interference.[7] Moreover, bright rays of light striking the eye have a cumulative effect of strain and fatigue.[8]

Eyes require well-diffused light from a large source. Concentrated light sources of high brilliancy, even when not within the field of vision, tend to favor specular glare (reflected glare from the page or desk)[5] and contribute to strain. Indirect illumination reflected from a large light-colored source (an ivory or light cream

ceiling) is more conductive to eye efficiency and eye comfort than is a direct light. In indirect illumination, the ceiling of light color becomes the secondary source, and the light reflected from it is well diffused, especially when the reflector and wattage used illuminate a large surface on the ceiling, and when the walls are also light colored. The importance of securing a well-diffused light can hardly be overestimated.

Dormitory Room Lighting

The foregoing facts on light as an aid to vision may be applied to many types of environment. The present consideration is limited to the college dormitory situation, for in this environment a large part of responsibility rests upon the student himself. Even in colleges in which the administration provides good rooms and adequate lighting facilities, the arrangement of lamp and desk usually is left to the individual student.

College dormitory rooms vary in size. Hayes gives the range in area as follows: single rooms, 100 to 160 square feet, with a ceiling height of about eight and one-half feet; double rooms, 200 to 279 square feet, with ceiling height of nine feet. In such rooms, with cream walls and ivory ceilings, adequate, well-distributed illumination can be secured through the use of a study lamp constructed according to the specifications on page 34. The height of the lamp and the use of the reflector (glare-reducing bowl) tend to reduce the possibility of specular glare. The diameter of the reflector, and the wattage of the recommended lamp, favor the lighting of a large surface on the ceiling, thus providing good diffusion. Contrasts in intensity between different areas in the room are reduced, and the desk illumination is not more than five times as great as the general illumination. The specifications herein offered were developed from the use of the regular I.E.S. student lamp in many dormitory situations. The floor lamp type selected has an advantage over the table lamp in that it can more easily be placed outside the field of vision.

The provision of a good lamp in a dormitory room does not solve the lighting problem. The proper use of the lamp is essential; so is its care. The photographs and diagrams in this paper illustrate the placement of lamp and desk to provide adequate illumination

on the work and at the same time safeguard the student from glare.

It is well to remember that the continued efficiency of the lamp depends upon maintenance of a clean reflector and upon replacement of the bulbs when needed. In replacing a broken reflector or bulbs, the following facts should be kept in mind:

(1) Standard reflectors of a given diameter have the same density; the reflector specified for the new student lamp on page 34 has a density that calls for a 150-watt bulb.

Figure 3.—Position of the lamp in a double room with desks arranged for two right-handed students. As in Figure 2, the students are receiving adequate, well-diffused illumination, and are protected from direct glare by the arrangement of desk and lamp which keeps the light source behind the left shoulder of each.

(2) The use of a reflector of smaller diameter results in glare; the density of the reflector with greater diameter reduces the intensity of light on the working surface.

(3) Likewise, bulbs of lower wattage used with the specified reflector reduce the level of intensity on the working surface, and bulbs of higher wattage tend to increase glare.

Individual desks are desirable, not only because they facilitate

the proper use of light, but also because they are an aid in reducing distractions for the student. The preferred desk is the flat-top type, with a working surface of not less than 30 by 40 inches, with a dull surface. The highly polished top reflects light and results in specular glare.

When assignments call for reading material printed in small type or for the transcription of pencilled or longhand notes, the use of a book rack (illustrated in Figures 2 and 3) makes it possible to tilt the book or paper at an angle that increases the level of intensity on the page, which increases the contrast between the background and the printing or writing, thus making the page more easily read.

Good Study Facilities for a College Dormitory

Recommendations of the Eye Health Committee of the American Student Health Association, in co-operation with the National Society for the Prevention of Blindness, for good study facilities for a college dormitory are as follows:

The Room.—Ceiling, white; walls, light tones; both in dull finish—no high polish.

The Desk.—Individual; size of top: not less than 30 by 40 inches; surface: dull finish (does not mirror light); blotting pad: soft tones—brown, green, blue; book rack: dull finish, of firm construction.

The Reading Chair.—The chair used with satisfaction by college students is usually a low, easy chair of approximately the following dimensions: Height of back, 36 inches; height of seat, 17 inches; depth and width of seat, about 21 inches; depth of chair from front edge of arm to the back of the chair, 30 inches; depth of arm rest from front edge, 10 inches.

Illumination.*—Intensity on working surfaces: 10 to 20 foot-candles.† General illumination not less than 1/5 of desk illumination.

Glare Control.—Lighted bulbs, mirroring surfaces, and deep shadows kept outside field of vision.

* Note specifications for student lamp on page 34.

† The desk surface near the lamp described on page 34 receives more than 20 foot-candles, while the further edge of the working surface receives more than 10 foot-candles; 15 foot-candles would be produced on a horizontal plane at desk level within three feet of the shaft of the lamp, thus providing on the printed page the amount recommended by "American Recommended Practice of School Lighting."

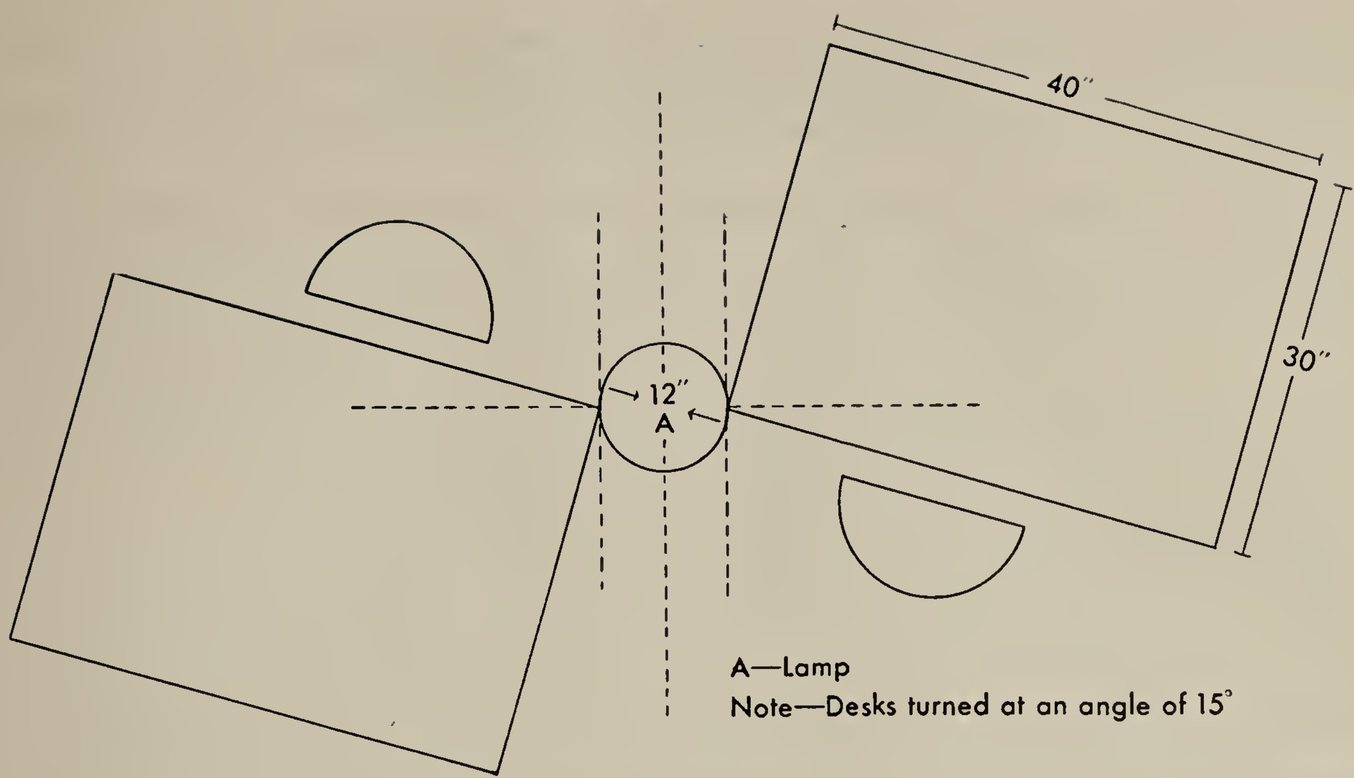

Figure 4.—Desk and Lamp Arrangement for Two Right-handed Students

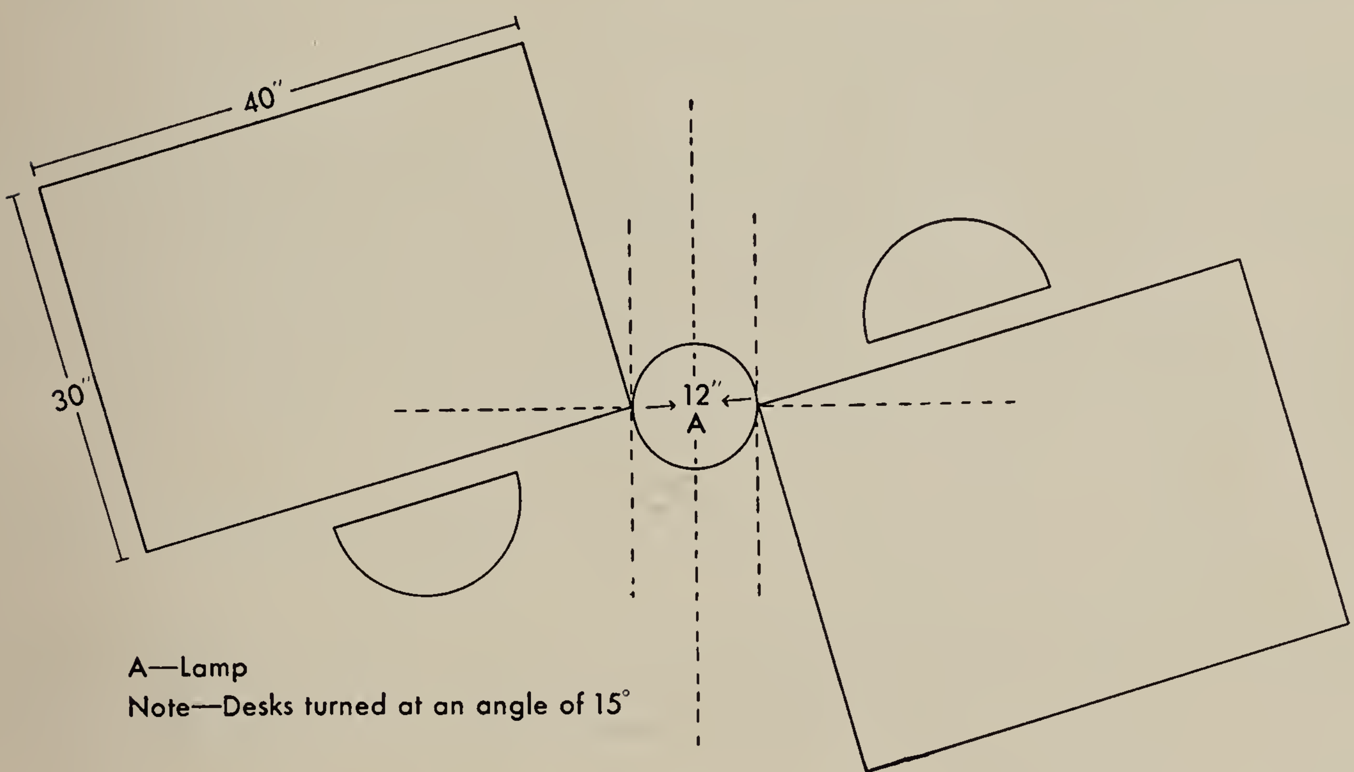

Figure 5.—Desk and Lamp Arrangement for Two Left-handed Students

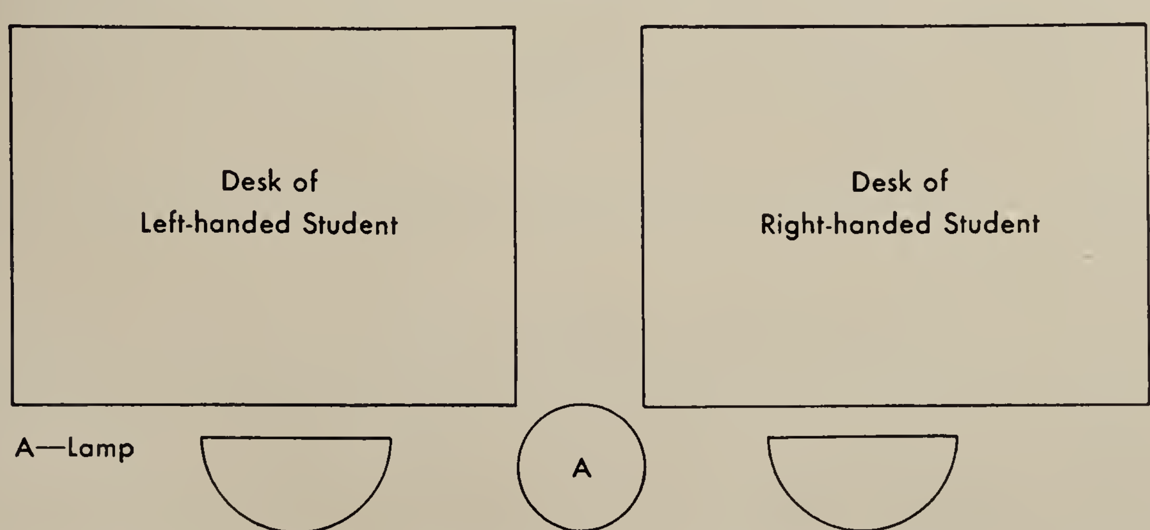

Figure 6.—Desk and Lamp Arrangement for Two Students—One Left-handed

Glare Hazards to be Avoided.—Uncovered light bulbs; direct ceiling light; goose-neck lamps on the desk, resulting in bright circles, dark shadows and sharp contrasts; table lamps, decorative or otherwise, within the field of vision, especially where the height of the filament from the desk top produces specular glare; shiny or glass-covered desk surfaces causing specular glare.

Use of the Lamp.—(1) Place the lamp just outside the field of vision; i. e., just behind the shoulder line. If left-handed, the student will get better service from a lamp set just behind the right shoulder; and (2) the reading chair should be turned so that a clear light falls on the page from a point just behind the shoulder line of the reader.

Student Lamp—Floor Type

The following specifications for a floor-type student lamp were prepared with the assistance of William Little, in compliance with I.E.S.* specifications, and with the approval of the Advisory Committee of Ophthalmologists for the Eye Health Committee of the American Student Health Association in cooperation with the National Society for Prevention of Blindness.

Standard.†—Strong, firm, maintaining vertical position; height: 60 inches from floor to light center; base: diameter, 10 to 12 inches; weighted to prevent tipping.‡

Reflector (Glare-Reducing Bowl).—Type: certified I.E.S. specification reflector; brightness—not more than 3/c per square inch; diameter: 9⅜ inches.

Shade.—Type: parchment or other material approved by the I.E.S.; diameter: upper rim, 9½ to 10 inches; lower rim, 23 to 24 inches; depth: diagonal, from upper to lower rim, 12 to 13 inches.

Lamp.—150 watts.

Intensity.—Minimum of 15 foot-candles within a circle having a six-foot diameter.§

* I.E.S. refers to the Illuminating Engineering Society.

† Experience indicates that a lamp cord 12 feet in length obviates the need of an extension cord in the usual dormitory room. This lamp has an open top and collects dust rather rapidly. Frequent cleaning should be arranged for, as dust tends to absorb the light and to cause depreciation.

‡ The base and standard should weigh not less than 16½ lbs. to prevent the lamp from being easily tipped over.

§ See footnote† on page 32.

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Injuries to the Eyes*

Joseph Dessoff, M.D.

THOUGH wonderfully protected by the natural anatomical construction of the human skull, the eyes have become subject to a variety of injuries brought about especially by industrial hazards, and therefore require special consideration on the part of industry as well as medicine.

Anatomical and Physiological Considerations

Appreciation of the danger of injuries to our eyes must have exerted a developmental influence in nature's protective location of the eyeballs. The structures surrounding the orbit—the cancellous bone, the somewhat elastic layers, the sinus cavities lined with mucous membrane—form a peculiarly effective protective wall for the orbital cavity, while the abundant blood supply reduces the danger of traumatic infection. The bony orbit, projecting above, farther than the eyeball, and supplemented by the bridge of the nose, protects the eye from gross mechanical injuries. No less do the eyelids and other soft tissues about the eyeball give it protection. The thickness and massive structure of the eyelids supplement the protection of the orbit in persons having prominent eyeballs, such as those of the Negro race. Projecting points and flying particles, caught in the soft, movable tissues, are checked and diverted by such movement and are thus rendered comparatively harmless.

The general sensitiveness of the cornea and conjunctiva gives instant notice of foreign bodies; and the prompt and compelling reflexes, closing the eyelids and holding the parts fixed and the eye at rest, protect from other possible injuries. The strong reflex

* Read before the Institute on Conservation of Vision, sponsored by the District of Columbia Society for the Prevention of Blindness, Washington, D. C., November 18, 1938. The author expresses indebtedness to *The Eye and Its Diseases*, by Conrad Berens, for much factual material contained in this article.

cramping of the eyelid tends to keep in one position a foreign body caught under the eyelid. Even a sharp fragment, so caught, would cause less general scratching or scraping of the cornea than often results from inexpert efforts to remove a foreign body.

The structure of the normal eyelid is entirely suited to its protective function. Its smooth lining is furnished by healthy conjunctiva and it fits closely over the eyeball. The eyelid is freely movable and can push aside under the impinging force of a foreign body and direct that force to act more obliquely on the eyeball, or away from it entirely. The oily secretion on the margins of the eyelids retains the tears in the conjunctival sac, keeping the cornea always moist, and preventing mixture with fluids that might be injurious. The lashes, curving from the eyelid margins, come together when the eyelids are nearly closed, so that, while permitting some vision, they form an almost complete screen for the exclusion of small insects and flying particles of dust, threads, or hair.

The lacrimal secretion, or tears—a mild, soothing, neutral solution bathing the cornea and conjunctival sac—has a chemical composition that makes it an effective germicide to combat infections that may be carried to the eye by the atmosphere. The secretion of tears is instantly increased by any irritating contact with the cornea or conjunctiva. Thickening of the tears by increase of mucus entangles dust and carries it away. The involuntary rolling up of the eyeball, with spasmodic closing of the eye when an irritant gets into it, places the cornea in a position affording the greatest protection from suddenly increased secretion. An understanding of the importance of the eyelids and lashes as protection to the eyes should prevent neglect of certain lid conditions often tolerated in childhood.

Types of Injuries

Injuries of the eyes may occur to persons of all ages. In a neighboring state a statistical study of ocular injuries occurring after the passage of the Workmen's Compensation Act of January, 1916, reveals that in 15 years 8,619 eyes were lost, for which compensation amounting to $12,541,673 was paid. The number of eyes lost was greater than the number of lost legs, arms, hands, and feet combined.

Foreign bodies in the cornea constitute the largest single class

of injuries. They are usually superficial, but at times are found deep. Many varieties of substances may be found imbedded in the cornea: bits of glass, stone, oyster shell, scales of paint or metal, mostly iron or steel. In all cases the foreign body should be removed promptly to prevent inflammation, sloughing and ulceration of the surrounding layer of tissue, nature's method of accomplishing the removal of a foreign body that is left undisturbed.

Following the extraction of a hot, metallic foreign body, it is essential to remove the layer of brownish, burned or oxidized tissue usually remaining. If a corneal bur is used to remove this tissue, it will in addition smooth out the surface and the rough sharp edges of the foreign body crater, eliminating a harbor for bacteria and adding greatly to the patient's comfort.

The infrequency of injuries to the conjunctiva alone is due to its loose attachment to the sclera. This permits the conjunctiva to give before an impact by sliding and stretching. The conjunctiva frequently retains a foreign body. Lacerations and tears soon heal by primary union; when extensive, they can be repaired by suturing with fine black silk. Mild injuries caused by dust, vapors, fumes, and trauma may produce traumatic conjunctivitis, a painful irritation associated with intense redness, sensitivity to light, tearing and swelling of the eyelids. In addition to the large number of foreign bodies the cornea may harbor, it is subject to painful abrasions and erosions. If neglected and allowed to become infected, these lead to ulcer formation. Non-penetrating incised wounds usually heal promptly when no infection is present.

Burns and corrosive injuries are caused by hot water, steam, hot metal, gunpowder, corrosive gases, cigar ashes, acids and alkalis. Probably the most frequent of all alkali burns is caused by lime and probably the most severe is caused by ammonia. As a rule, the injury is more severe in the lower part of the conjunctival sac, and frequently is much more severe than the initial examination indicates. Often the conjunctiva, at the affected area, is destroyed and converted into an ulcer followed by the formation of a scar. Adhesions may form between the eyelids and eyeball, or between the eyelids and skin of the face. The prognosis as regards sight depends primarily upon the condition of the cornea. Any corrosive substance should be removed immediately and acids neutralized with

sodium bicarbonate. Alkalis can be neutralized by acetic acid or boric acid and, in the absence of these, copious irrigations with water are usually advisable.

Injuries with blunt objects may be very serious. The eye may be compared to a rubber ball. Any force, such as a blow by a fist, sufficient to produce compression of the eyeball, may lead to a variety of changes. The lens may become dislocated; the iris may be ruptured or torn away from its attachment; the choroid may rupture near the macula; frequently a detachment of the retina occurs and intra-ocular hemorrhages are common. Greater force leads to rupture of the eyeball.

The eye may be variously affected by light rays. The eye is well able to tolerate visible light. The protection by reaction of the pupil is valuable on account of its promptness. Dark glasses can never be so effective in protecting the eyes against light, and only the darkest are of much help. Transient effects of strong lights are scotomas or blind spots, but whether permanent damage can be produced by visible light is doubtful.

The eye is also sensitive to the invisible light rays. Infrared rays may produce cataracts, as in glass blowers: while eclipse blindness with actual changes in the retina at the macula is probably due to the heat action of the same rays. Snow blindness and electric ophthalmia are caused by ultraviolet rays; no permanent change is produced but the immediate reaction may be very severe. *X*-ray and radium emanations have frequently produced cataracts when the eye was carelessly protected during treatment.

Perforating injuries of the eyeball are fraught with danger. A careful study of the history will usually, although not always, indicate the character of the missile. A case in mind is one that was seen at the Episcopal Hospital recently. The history was that the patient was struck in the eye with a whip, but an *x*-ray taken two months later revealed a piece of wire one inch long in the eyeball.

The patient's statement after the accident that he saw the foreign body is not to be relied upon. In all cases an *x*-ray should be insisted upon.

The diagnosis of a perforating wound is established by several factors:

1. The presence of a visible laceration of the cornea or sclera,

which gapes on pressure. However, the absence of a visible wound does not mean that a foreign body is not present. In some instances small, very thin, metallic foreign bodies have penetrated the eyeball with no discoverable wound of entrance.

2. Reduction of the intra-ocular pressure or softening of the eyeball is a helpful sign.

3. Prolapse of pigmented tissue.

4. Prolapse of the vitreous: This generally takes the form of a bead, or stringy viscid mass, like the white of an egg, which prevents healing and favors infection if allowed to remain.

5. A shallow anterior chamber.

Penetrating wounds are generally produced by sharp objects or missiles that do not enter the eyeball in their entirety, as when a nail springs out from under the glancing blow of a hammer and its point lodges in the eyeball, the remainder being outside. In these cases the severity of the injury is related to its location, the extent of the damage to the structures involved and the very great danger of infection. Cases have been reported in which clean wounds healed without operative intervention, in certain cases without medical aid. However, complications are more apt to follow owing to the inclusion of various tissues in the scar.

Every eye with an intra-ocular foreign body is potentially lost. An x-ray should be made in every case of perforating wound of the eye and accurate localization secured by utilizing the modern methods. Magnetic foreign bodies can be detected by approaching a hand magnet or giant magnet to the eye. When this is close enough to bring the foreign body within the magnetic field, the pull on the metal causes pain and slight bulging of the tissues directly over the foreign body. The magnet must be carefully handled in order to avoid the danger of imbedding the foreign body in the tissues, making the extraction more difficult to perform as well as producing additional damage. If the magnet is suddenly brought close to the eye, it may exert too strong a pull on the foreign body, which may be drawn through and injure the lens.

There are reported in medical literature many cases of foreign bodies that have remained in the eyeball for varying periods of years.

Occasionally foreign bodies in the vitreous may be spontaneously

extruded after having destroyed the sight. Instances of pieces of glass and iron working out in this way have been reported by various writers.

Most eyes containing foreign bodies react promptly with severe inflammation. A quiescent case is never certain to remain so, and may suddenly flare up without warning and cause total destruction of the eye. So long as a piece of metal remains in the eye there is always the danger of severe inflammatory reaction. An almost constant chemical reaction takes place as the foreign body is slowly dissolved by the solutions of the eye. A small particle of glass may produce only slight reaction, but copper is rarely tolerated and generally produces a severe purulent inflammation with destruction of the eye.

Sympathetic Ophthalmitis

This is one of the most dreaded eye diseases with which the ophthalmic surgeon must contend. It is a special form of inflammation in which, as a result of injury or disease of one eye, inflammation is set up in the fellow eye. It is fortunately a rare condition. The majority of cases are due to perforating wounds, either traumatic or operative. Wounds through the ciliary body are most likely to be followed by sympathetic ophthalmitis, while corneal wounds without prolapse of the iris involve only slight danger of the disease.

Sympathetic ophthalmia has occurred after operations on the eye, particularly after cataract operations; it may also occur after perforation of a corneal ulcer, and following the development of intra-ocular tumors.

Every clinician has seen numbers of severe wounds involving the ciliary body which have healed without the development of sympathetic ophthalmitis, and there is no way in which it may be told from the onset whether sympathetic ophthalmitis will develop. It is generally recognized that the clean wounds which heal without signs of inflammation are free from danger, and that when a purulent infection has developed the danger is also slight.

The cause of sympathetic ophthalmitis is unknown. Many theories have been proposed but none are definitely proved. Probably an infection with some living organisms occurs in the injured eye, and the infection is then transmitted to the other eye.

In the majority of cases the second eye becomes affected between 4 to 8 weeks following the injury. Some cases have been reported as occurring years after the injury, although these are rare and somewhat doubtful. The first sign usually noticed in the second eye is a gradual loss of vision. Somewhat later sensitivity to light occurs and there may be slight pain. The eye may become hard at first, but as the condition progresses it becomes very soft.

Some cases seen very early may respond to treatment as readily as the average case of iritis. Cases seen later, and a number of those which are seen quite early, run a severe course in spite of treatment and go on to shrinking of the eyeball. The typical case responds to treatment very slowly and remains active for months.

The diagnosis of a typical case is seldom difficult. When a history of a penetrating wound is given, one naturally thinks of sympathetic ophthalmitis at the first sign of inflammation in the second eye. If this occurs within six weeks after the injury and the injured eye is still inflamed, the diagnosis is almost certain. If inflammation occurs after much longer periods, other causes must be considered and searched for.

The most important consideration in the treatment of sympathetic ophthalmitis is the prevention of the disease. Prompt enucleation of eyes following severe injuries undoubtedly prevents many cases and should always be urged when no vision is present and the injury is one which will render the cosmetic effect worse than that of a glass eye. When the injured eye retains vision, the decision as to proper procedure becomes a difficult one indeed. In the case of patients who cannot be properly observed and controlled, one is inclined to err on the side of safety and remove eyes which might be saved under more favorable circumstances.

When sympathetic ophthalmitis is already present, the injured eye, if already blind, should be removed. But if vision is present in the injured eye, it is often best to leave it in because ultimately this eye may be a more useful one than the secondarily affected one.

When enucleation is decided upon it should be performed at once —a delay of one or more days may materially affect the outcome.

A doubtful prognosis must be given in sympathetic ophthalmitis, since some cases, especially those in children, seem almost unresponsive to treatment.

Treatment of Injuries of the Eyes

Superficial injuries of the cornea and conjunctiva should be flushed thoroughly with warm boric acid or salt solution. Any foreign matter difficult to wash out may be removed with a wet cotton applicator or picked out with forceps. Abrasions and erosions in the surface epithelium of the cornea can be detected by the use of a corneal stain, fluorescein, which colors them a brilliant yellow green. The instillation of a few drops of a local anaesthetic solution, or the application of an ointment containing a local anaesthetic, quickly relieves pain and light sensitivity. In some cases smoked glasses will give relief, but greater comfort and protection may be obtained by the application of a sterile dressing or a bandage.

Iced compresses are of value when applied early. They should be used continuously in the acute stages of severe cases. Some ophthalmologists prefer heat in the form of hot applications or compresses. The instillation of homatropine or atropine will prevent inflammation of the deeper structures. When severe wounds are contaminated by dirt or have been exposed to infection through delay in receiving proper treatment, the patient should be given tetanus antitoxin. In gunshot and penetrating wounds also tetanus antitoxin should be given immediately after the injury.

If injuries are complicated by infection into the anterior chamber of the eye, injections of a non-specific foreign protein are of value. Boiled milk, typhoid vaccine and diphtheria antitoxin are favorites in use. The treatment is successfully used to build up general resistance to infection.

Lacerations of the conjunctiva should be sutured with fine black silk unless the edges are in apposition, in which event the wound will heal without suturing.

Wounds of the corneoscleral junction are often complicated by prolapse of the iris, ciliary body and choroid. If the iris has prolapsed, that portion should be grasped with forceps, withdrawn, and carefully excised to remove the portion damaged by compression between the edges of the wound. If the ciliary body or choroid has prolapsed, it should be carefully replaced. These wounds may be covered with sliding conjunctival flaps. Wounds in the center of the cornea may require complete covering with conjunctiva either as a sliding flap or by a purse-string suture.

When wounds are so extensive and destructive that it would be impossible to preserve the eye or avoid the danger of sympathetic ophthalmia, immediate primary enucleation is done. Following the primary repair of a penetrating or perforating wound or injury a successful termination should be expected if the inflammation gradually subsides, if pain, irritation and photophobia disappear, and if function is restored either partially or completely. On the contrary, unfavorable symptoms may develop, as when the vision is entirely lost and the eyeball is painful and dangerous to the fellow-eye. This condition necessitates late or secondary enucleation.

The first step in the treatment of a foreign body in the vitreous should be the immediate removal of the foreign body. If magnetic, the hand magnet or giant magnet may be used. Non-magnetic lead shot may be removed by use of a specially constructed forceps and the aid of a biplane fluoroscope. A foreign body in the lens produces less reaction than in any other part of the eye, and may be extracted with the cataractous lens.

Foreign bodies in the anterior chamber of the eye may be removed after opening the anterior chamber, by flushing or by the use of forceps. When embedded in the iris, they can be removed by excising the section of iris containing the embedded foreign body.

Compensation for Injuries

Injuries may result in permanent or partial loss of function or permanent loss of one or both eyes. Almost all states have workmen's compensation laws which regulate the amount of money to be paid for injuries resulting in permanent or partial loss of one or both eyes. Before the compensation due a workman can be fixed, it is necessary to determine the amount of damage to his eyes and their function caused by the injury. In order to determine the degree of visual efficiency, three elements of vision must be studied: first, the acuteness of vision; second, the field of vision; and third, muscle function. Although these factors do not possess an equal degree of importance, no act of vision is perfect without the coordinated action of all.

The maximum limits of visual efficiency consist of a visual acuity of 20/20; a full visual field; and the absence of double vision. The minimum limits of visual efficiency are a visual acuity less than

20/200; a visual field contracted to 5°; and the presence of double vision in all directions.

To calculate the dollars and cents value of an eye is a complicated problem, since no two persons have the same earning ability nor can an impairment of earning ability be calculated by mathematics alone. Compensation for ocular injuries is based on the percentage loss of visual function as it affects the earning ability of the individual.

Prevention of Injuries

No discussion on injuries of any kind is complete without reference to protective and preventive measures, and eye injuries are no exception to the rule. One thing that is often overlooked in discussions of this kind is the importance of wearing correcting glasses when they are indicated.

So commonly are correcting lenses required that they may be regarded as a supplemental defense against ocular injury. Injuries become less frequent when lenses are constantly worn. In certain occupations in which injury from small, flying foreign bodies is common, the enforced wearing of protective goggles has diminished to a marked degree the number and danger of such injuries. Accurate vision, secured by glasses, has another protective influence that is not so generally understood. Exactness of orientation and co-ordination depends on accurate vision, which is often impossible without correcting lenses. Instant response to impending danger cannot be developed in one who has myopia or astigmatism, except for the limited range of accidents which can be apprehended with diminished visual acuity. Lack of protective reflexes dependent on sight is an important cause of accidents to children and elderly people.

The development of co-ordinations and reflexes to avoid such dangers is a condition necessary to bodily safety. The maintenance of the best vision must be considered essential to health, and the wearing of needed glasses a physiologic condition that may rank with a normal supply of oxygen, food or water. Co-ordinations and reflexes are developed at first by observations and responses that are conscious and voluntary; then they become habitual and unconscious and finally are established as reflexes. This development

cannot be complete unless the impressions that originate protective reflexes are constantly repeated. Every person who puts on glasses has to pass through the adaptive process. It begins with the wearing of glasses, it is interrupted by leaving them off, and must be repeated whenever they are worn. The person who does not like glasses may wear them interruptedly for months or years without establishing the co-ordinations of vision and motor reflexes essential to safety. For young people handicapped by defective refraction, the constant wearing of corrective glasses is most important as a part of their protection against accident.

Some measures adopted in large industrial centers for the protection of the eyes of employees might be applied to the protection of the public in general. These include the following:

1. The preliminary and necessary periodic examination and refraction of the eyes.
2. The special examination and fitting with glasses for exacting work requiring accurate vision.
3. The selection of goggles and masks with the proper optic lenses.
4. The prevention of electric ophthalmia.
5. The use of various types of glass to eliminate ultraviolet and infrared rays when these are injurious to the eyes.
6. The guarding of machines to prevent flying particles and sparks striking the eye.
7. Proper illumination and elimination of glare with consequent reduction of eye fatigue.
8. The elimination or neutralization of fumes and gases causing inflammation and irritation.
9. The training of personnel in the first-aid dispensary.
10. The stimulation of interest, activity and co-operation in safety committees.
11. Legislation to control the sale of fireworks, explosives, and toys which are apt to be dangerous to the eyes of children.

An Evaluation of Vision-Testing Methods in Schools*

John B. Hitz, M.D.

THE author presents this useful evaluation of the various methods of testing vision in the schools—of special interest to school physicians, school nurses, and teachers.

THIS study was undertaken because of a considerable number of inquiries on the part of educators and physicians in regard to the proper or best methods of testing school children's vision, and because of rather definite disagreements among ophthalmic physicians as to how detailed a vision test should be used in the schools.

It is assumed at the outset that a "screening" test for visual efficiency in schools should have certain attributes. It should pick up the majority of visual deficiencies without including minor transitory visual disturbances, functional or psychological in origin; it should be quick and easy to operate without the need for special training or technical knowledge.

This paper is in the nature of a preliminary report, comparing a small series of subjects tested with the Snellen chart, the stereoscopic method of Betts, and by a thorough ophthalmological examination. The group comprised 32 children, ranging in age from 6 to 14 years, all of whom were referred to the ophthalmological department of the Milwaukee Children's Hospital; hence they do not represent a cross section of average school children.

All children in this series had received a retinoscopic refraction under either atropine or homatropine cycloplegia by the cylindrical method of Lindner. The refractions were all tested by the author

* This is a preliminary report, reprinted, with permission, from the September, 1938, *American Journal of Ophthalmology*.

within six months preceding the time of examination. The cases were unselected except that those of obvious ocular disease and manifest strabismus were eliminated.

The standard Snellen chart at six meters was used with uniform artificial illumination. The intensity of the light was not measured. The Betts tests were administered as recommended in Betts's textbook on remedial reading. This test was immediately followed by what we shall term an ophthalmic test, consisting of a Snellen test for distance as above, and a muscle-balance test at six meters and at 33 cm., using the Duane screen prism test and the Maddox rod. As far as possible the average of the two was recorded. Fusion tests employed were the Worth four-dot test at six meters and 33 cm., at six meters the dots subtending an angle of 12 minutes and the distance between dots subtending an angle of 21 minutes; the four-dot at 33 cm., subtending an angle of 51 minutes, the distance between dots an angle of 177 minutes.

Depth perception was tested on the Howard-Dolman apparatus, the operator setting the instrument according to mathematical chance (twenty cards shuffled before each test), correct answers in 8 out of 10 tests at a given separation of the pegs being considered as the correct determination. No subjective tests for astigmatism were attempted.

Results

A total of 48 tests was made on 32 patients, tests being made both with and without glasses.

A comparison of the Snellen test alone (with 20/30 vision or better being taken as normal) with the Betts test and thorough ophthalmic test revealed that in 48 examinations with the Snellen test visual defects were revealed in 24 (50 per cent). With the Betts test defects were found in 43 (89 per cent). By the ophthalmic test defects were present in 33 (69 per cent).

Analyzing the individual tests of the stereometric and the ophthalmic groups, we find in the comparison of visual acuity a total of 96 tests (two eyes, 48 examinations). In 74 tests (77 per cent) the two tests agreed (that is, the figures agreed within 20 per cent, using the industrial percentage of visual-loss tables published in Berens's textbook on ophthalmology). In 22 cases (23 per cent of

total) there was a disagreement, and of this group in 15 tests (66 per cent), the Betts test disclosed the greater deviation from normal; in seven tests (33 per cent) the ophthalmic uncovered a greater error.

This discrepancy in figures is explainable on two counts: first, using the dot test, higher astigmatic errors are not picked up; second, the stereoscopic test allows suppression to occur which is not possible in the ophthalmic tests.

In the muscle-balance tests (that is, the average of the screen prism tests and Maddox rod) an esophoria or exophoria at 6 meters of 4 diopters was considered abnormal; an esophoria of 4 diopters or an exophoria of 6 diopters was considered abnormal at 33 cm.

Out of 96 tests (48 examinations for both 6 meters and 33 cm.), in 81 (84 per cent) the Betts and ophthalmic tests agreed. In 15 tests (16 per cent) there was disagreement, and of these the Betts tests disclosed a greater deviation from normal in 3 (19 per cent), the ophthalmic in 12 (81 per cent).

The discrepancies here can be accounted for, first, because the standards set in both tests were purely arbitrary, and, second, because there is admittedly a psychic convergence stimulus in the use of the stereoscope as a test for muscle balance.

The visual angles subtended by the fusion tests (Worth four-dot at 6 meters and 33 cm.) in the ophthalmic group were given previously, 12 minutes at 6 meters, 51 minutes at 33 cm.; the angle subtended by the Betts tests is 17 minutes, both distance and near being the same, the only difference being the amount of accommodation and convergence employed. In 96 fusion tests (48 examinations for distance and near) the Betts and ophthalmic agreed in 49 (51 per cent), disagreed in 47 (49 per cent). Among those which disagreed the Betts tests showed a greater deviation from normal in 40 tests (85 per cent), the ophthalmic in 7 tests (15 per cent). At least one cause of the discrepancy in these figures is obvious; namely, the difference in the visual angles subtended by the various tests. And again the psychic convergence of the stereoscope probably is a factor.

The comparison of depth perception or stereopsis is a somewhat difficult problem inasmuch as accommodation and convergence play a much larger rôle in the measurement on the stereoscope than

in the Howard-Dolman apparatus. Mathematically the comparison can be made by measurement of the parallactic angle. With the Howard-Dolman apparatus a depth perception of 25 mm. at 6 meters subtends a parallactic angle of 10.4 seconds; depth perception of 150 mm. subtends an angle of 56 seconds. Comparatively the Betts stereopsis slides subtend angles varying from 140 seconds to 1,300 seconds. With this large difference in the mathematical comparisons, even allowing a large percentage of error for the factors of psychic accommodation and convergence, one can safely assume that anyone showing a depth perception of 50 mm. or under on the Howard-Dolman apparatus should show close to 100 per cent stereopsis on the Betts test and, conversely, any subject showing near 100 per cent with the Betts test might logically show no depth on the Howard-Dolman. Taking this basis for comparison we find agreement of the tests in 34 (72 per cent) of 47 tests. In 13 tests (28 per cent) the Betts tests showed 70 per cent stereopsis or better, while the Howard-Dolman, a much more accurate test mathematically, showed a depth-difference perception of better than 50 mm. at 6 meters. In commenting on the discrepancy in these two tests one can only say that depth perception under natural conditions, as with the Howard-Dolman apparatus, assuming, of course, a nearly normal visual apparatus, is an easy automatic psychic act, while many persons have difficulty and must make a conscious effort to obtain stereopsis on an instrument such as the stereoscope.

In attempting to compare the Betts sharpness-of-image tests with a test used in average ophthalmic practice the only tests available are the astigmatic dials. These tests seemed to us to be impractical of application in a series of young children. The Betts tests were therefore compared to an arbitrarily selected standard of refractive error found on retinoscopy under cycloplegia. The limits of normal refraction were taken as minus 25 D., plus 1.00 D., and one-half diopter astigmatic error.

On this basis the Betts and refractive tests agreed in 25 (78 per cent) of the 32 subjects with uncorrected vision and disagreed in 7 (22 per cent). Of these seven tests, Betts showed the greater deflection from normal in four, the refraction in three. In the 16 corrected with glasses there was agreement of the tests in 9 (56 per

cent) and disagreement in 7 (44 per cent). In other words, in the cases of uncorrected vision there was a 22 per cent discrepancy in findings comparing the Betts astigmatic test with an arbitrary amount of refractive error. However, when that error was fully corrected to the best of the author's ability with accepted methods of refraction there remained 44 per cent of the subjects with corrected vision who still showed errors with the Betts test.

Discussion

In discussing methods of testing school children's eyes one can easily get into a controversy on how high a standard should be set; this then quickly leads to a discussion of whether the average children's eyes are deficient, or whether the educational requirements today are too great for the physical (ocular) equipment with which nature has endowed us.

Therefore, let us set forth a few postulates which would seem to be fair criteria of a screening test to be used in the schools for the selection of those who should be referred to an ophthalmologist for examination because of defective vision:

1. As stated earlier, any such test should pick up most errors without finding minor transient psychic effects.
2. The test should be easy to operate.
3. The test should not be more discriminating than the accepted thorough examinations utilized by the majority of competent, well-trained ophthalmic physicians.
4. If the principles on which the test is based are different from those accepted by competent ophthalmologists, then at least the findings must agree fairly accurately with the findings of a thorough ophthalmic test.

The Snellen chart alone, having missed a considerable number of errors recorded by both the Betts and the ophthalmic tests, would be eliminated by the first postulate.

Ease of operation would eliminate any such complete test as described as the ophthalmic test in this paper.

The Betts tests immediately open themselves to criticism as being too discriminating, since they picked up errors in 89 per cent of cases as against 69 per cent in the ophthalmic test. Further, in analyzing the individual tests of the Betts series, one finds that in

the visual acuity tests, the fusion tests, the depth-perception tests, and the sharpness-of-image tests, the Betts series was definitely more discriminating, and that in the muscle-balance tests alone the ophthalmic test disclosed a greater deviation from normal. In fairness to the manufacturers it must be stated that they ask that the test be accepted as a whole, not separated into its component parts. This request does not appear to me to be reasonable, since the whole test is made up of its component parts and errors creeping into the individual test must influence the accuracy of the test as a whole.

Finally, the question arises as to whether the findings of the Betts test agree (inasmuch as the principle of the stereoscope is brought into the picture) essentially with more or less standard accepted ophthalmic tests. In the visual acuity tests there is a discrepancy of 23 per cent, in the muscle-balance tests a difference of 16 per cent, in the fusion tests a difference of 49 per cent, in the depth-perception tests 28 per cent, and in the sharpness-of-image tests compared to refractive errors, 22 per cent.

Conclusions

1. This paper is to be regarded as a preliminary report, and definite conclusions from such a small series of cases admittedly not average school children must be drawn with great caution. It would appear that on the basis of this study the Snellen chart alone is inadequate as a test for school children's visual efficiency.

2. That the Betts tests in their present state of development pick up errors that are transitory or do not exist in the normal use of the eyes.

3. That the thorough ophthalmic test is impractical and that the ideal may be to add to the Snellen test a simple test of fusion and muscle balance which could be operated by the teacher or school nurse.

Annual Conference of the National Society for the Prevention of Blindness

NEW YORK will be the Mecca of the New World during the forthcoming months devoted to the activities of the New York World's Fair, 1939. With the hope that the headquarters of the National Society for the Prevention of Blindness will be the Mecca for the prevention of blindness workers in the United States during this time, the Society is planning to hold its Annual Conference October 26, 27, and 28, so that those from distant points who may be planning to enjoy the World's Fair may perhaps make their plans so that they may at the same time participate in the program of the Society.

Headquarters for the Annual Conference will be the Astor Hotel in New York City. The Society will be glad to make reservations in advance at this or other adjacent hotels for anybody planning to participate.

It is hoped that the Conference will bring together from many states physicians, teachers, nurses, social workers and those active in the various fields of sight conservation. Arrangements will be made for extending the facilities of the Society's offices at Rockefeller Center, 50 West 50th Street, to all visitors.

Following is a tentative program indicating topics and time planned for the various meetings:

Thursday, October 26

Morning —Nursing as It Relates to Sight Conservation.

Luncheon Meeting—Possible continuance of the above topic.

Afternoon, 4:00 to 4:30—Annual Meeting of the National Society for the Prevention of Blindness.

Dinner Meeting —Subscription dinner sponsored by the Board of Directors.

Friday, October 27

Morning —Sight Conservation in Industry.

Luncheon Meeting—The Doctor in Conserving the Sight of the Preschool Child.

Afternoon —Social Work in Prevention of Blindness.

Dinner Meeting —Subscription dinner on medical participation in the prevention of blindness.

Saturday, October 28

Morning —Sight-saving classes.

Luncheon Meeting—Summaries of topics presented during the sessions of this conference.

A complete program containing the speakers and exact subjects of individual papers will be printed when plans for the Conference are completed, and will be sent to anyone applying to the Society's offices for copies.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

A Proposed Sight-Saving Class Program for Tennessee*

Editor's Note.—This is an extract comprising an abstract of, and a chapter from, the author's master's thesis, "A Proposed Sight-Saving Class Program for Tennessee."

Abstract of Thesis

The problem involved in this study is to determine what sight-saving classes are, the extent to which these classes are being used by the different state systems, and whether or not they should be included as an integral part of the educational program of Tennessee.

The data upon which this study is based were obtained from eight sources: first, current professional literature; second, reports of the White House Conference on Child Health and Protection; third, the National Society for the Prevention of Blindness; fourth, the library of the American Foundation for the Blind; fifth, a visit to the sight-saving class in the Maury School, Memphis; sixth, records of the Tennessee School for the Blind; seventh, state publications of the Department of Education; eighth, United States Office of Education bulletins.

The findings of this study may be stated as follows: first, sight-saving classes are no longer experimental and compose an integral part of other state programs; second, they have three fairly definite aims: (1) to instruct pupils with a minimum of eyestrain; (2) to teach children to conserve their own vision; (3) provide vocational training for children of low vision; third, these classes have proved to be the best form of special education for children of low vision; fourth, the principles of sight saving are out-

* From the author's master's thesis, "A Proposed Sight-Saving Class Program for Tennessee," George Peabody College for Teachers, Nashville, August, 1938.

lined primarily for the conservation of vision while the child is being educated in the regular classes with children of normal vision, thus giving a valuable social training; fifth, sight-saving classes are essential to a state school system in order to satisfy the social and economic aims of education; sixth, these classes are economical: (1) they increase the rates of promotion; (2) sight-saving pupils are often returned to the regular classes with improved vision; (3) they make social assets rather than juvenile delinquents out of partially-sighted children; (4) it is far cheaper to educate children of low vision in these classes than in residential schools for the blind; seventh, Tennessee should establish sight-saving classes in the following cities: Chattanooga, Jackson, Johnson City, Knoxville, Memphis, and Nashville. A class at the Tennessee School for the Blind will serve partially-sighted children from rural sections not reasonably close to one of these cities.

Sight-Saving Class Pupils in Tennessee

The 1937 annual report of the department of education of Tennessee shows that it has an elementary school population of 436,569 white children. According to the accepted ratio recognized by Newton* and Hilleboe†, one sight-saving class pupil in each 500 of school population, there are approximately 873 boys and girls in this state who need the advantages of this specialized form of education. At present there are 16 of this number who are being properly cared for in the Memphis class, and there are 33 others who are pursuing the course of the totally blind, which means that there may be 824 pupils who are afflicted with low vision either from some defect of the eye or some disease that impairs vision, who are being neglected by the state educational program.

For nine years the Junior League of Memphis tried to establish a sight-saving class in Memphis; and finally, with the aid of the city health and education departments, together with the Sight-Saving Council, a class was organized in the fall of 1937 at the Maury School under the instruction and supervision of Miss Rosalie Dunagan, who had received instruction and training in sight-saving class work at the Western Reserve University, Cleveland, Ohio. The class was composed of 14 pupils at the beginning, but the number grew to 16. It is interesting to note that these children, representing only five grades because there were none in the third, came from 12 schools which were located in every section of the city.

The expenditure for special lighting fixtures and sight-saving furnishings ran close to $4,000; however, the authorities realize their

* Newton, Florence Louise, *Sight-Saving Classes in the United States: Their Development and Interpretation*, 1934, p. 19.

† Hilleboe, Guy L., *Finding and Teaching Atypical Children*, 1930, p. 83.

mistake in spending so much money. The room, which is 23½ by 33 by 13 feet, is lighted by six totally indirect lamps of 1,000 watts each. These are equipped with switches of several speeds so as to govern the intensity of light to suit the day, bright or cloudy. The room has 248 square feet of blackboard surface, which may be lighted by other special lights. The orientation is northern, but the building is rather old, and the windows do not give the proper ratio for natural light. The ceiling is white, the walls are buff with gray trimmings, and the shades, adjustable from both top and bottom, are buff also. The desks are adjustable from the horizontal to the vertical, and they are not anchored to the floor, making it easy for individual pupils to adjust themselves to the light. Lesson plans are prepared on a typewriter with large type, and these materials may be mimeographed for the students for lessons that are not available in the large-type books.

The class is operated on the cooperative plan, whereby the children go to the regular classes to recite their lessons. The members of the Junior League take turns in assisting the teacher with the preparation of lesson plans and in doing individual work with the pupils. These young women are to be commended for the splendid work they have done in showing the educators of Tennessee that sight-saving class work can be done in Tennessee just as well as it can in other states.

The League is so well pleased with the accomplishments that plans are being made for the organization of a junior high school class in the near future.

According to a survey of the blind and partially sighted which was conducted in Tennessee by the Department of Education in 1935–36, Nashville was the only city in which enough children were found to start a sight-saving class. Most of these 13 have attended the residential school for the blind since that time. This is no indication that the other cities do not have children of low vision, but it does indicate that they were more easily found in Nashville. The fact that the residential school and the Commission for the Adult Blind are both located in Nashville, no doubt, is a partial explanation of this occurrence. In the other cities, the men taking the survey did not have as good means of contact.

The survey was conducted by three men, one in each grand division of the state, who went from place to place getting, as best they could, information concerning the residence of these children. In some sections, especially the rural, it was very difficult to find the blind and more difficult to find people of low vision.

A check-up on the sighted pupils in the residential school for the blind is a good way to get a start

in locating sight-saving class pupils. A similar check-up was made at the Illinois School in 1931, at which time the work was instituted in the school.

In order that we may better understand the term "normal visual acuity," it is well to see just how the measurement is made. The White House Conference report states:

> In the so-called normal eye the visual acuity is indicated by 20/20, meaning that at a distance of 20 feet from a properly lighted and properly hung chart the person being tested will be able to read the letters, figures or signs indicated as the 20-foot line. A person having a visual acuity of 20/40 would, at a distance of 20 feet from the chart similarly arranged, be unable to read the line he would see at that distance, but can read a line that he should be able to see were his vision normal at a distance of 40 feet. It must be stressed, however, that this would not indicate a loss of 50 per cent of vision. According to the ophthalmological table, he would have remaining a visual acuity of 83.6 per cent. Near vision is measured in the same way, the notation being stated in inches.*

It may be noted here, too, that from 20/20 to 20/60, inclusive, is considered normal vision; from 20/70 to 20/200 is considered partial vision, or sight-saving class range of vision; and, below 20/200, vision is not sufficient to allow children to carry on their school work with the regular public school classes; thus, members of the latter group are considered educationally blind and must resort to the sense of touch as a means of obtaining an education just as though they were totally blind.

A survey of the records of the sighted pupils in the Tennessee School for the Blind reveals the fact that there are eight pupils in the school whose vision is normal and 24 others who have vision sufficient to attend sight-saving classes. Of this number there are no pupils who live reasonably close to Memphis. Nine of the number live in Nashville, two in Chattanooga, and one in Knoxville. The study of the records also shows that there are other pupils who have recently had eye operations that will, no doubt, improve their vision to the extent that they will be able to read large print. There are still others who need to have operations performed, but their parents have not given consent.

The study also shows that the pupils are distributed throughout the eight grades, and there is a rather wide range of vision, varying from nearly perfect to the lower range of visual acuity requiring sight-saving class facilities. These pupils are required to read their lessons in Braille, and they are segregated with the totally blind. They are at home during the summer months, losing valuable home training during the regular school year.

* Section III, 1931, p. 128.

Since most sight-saving class work is done in the first six grades, we may say that there are 20 left in those grades. This is too many for one class, for the authorities say that 15 or 16 are sufficient. Taking it for granted that those of normal vision will be able to pursue work in the regular classes, and eliminating those from the cities, there will be enough left from the small rural communities to start a sight-saving class in the school—17 to be exact. Such a class will not be a function of the school, but other states have found that it is necessary to do sight-saving class work in order to care for low-visioned children from rural sections.

The age-grade table for these 32 pupils shows considerable over-ageness, which is characteristic of children of low vision who have not had the advantages of sight-saving classes. In the elimination of some of the failures—one of the strong points in favor of classes of this type—some of this over-ageness is overcome in a short while.

Illinois, Michigan, Minnesota and Virginia Schools for the Blind maintain sight-saving classes. These four states evidently have found it necessary to accept sight saving, not as a function, but, through the lack of a means of educating rural children of low vision, as a part of their work.

It is not expedient to try to maintain classes of two or three in small communities; and, rather than board pupils in communities doing sight-saving work, it is perhaps best to send them to the residential school for the blind, where thay can receive the proper discipline during their early years of school life.

Using the accepted ratio of one sight-saving class pupil to each 500 of school population, we find that there are six towns and cities with six pupils or more each. It is highly possible to have enough for a class in smaller industrial centers with the proper check-up on the eyes of the school children. We may readily see that the four cities should have enough for two classes each. Hilleboe* suggests that, in a city of 50,000 population or more, the ophthalmologists and physicians could refer to the school authorities enough cases to start a sight-saving class.

Teachers can very readily detect evidence of eyestrain as well as diseases of the eye. Hilleboe† also points out the fact that portable lighted boards can be constructed at a cost of only $1.50 each, at which price every school could very easily own one. In this way teachers can test the eyes of the children and refer to an eye specialist those whose visual acuity is low. This suggestion is made because of the fact that very few schools are able to employ specialists as regular staff officials.

* *Op. cit.*, p. 85.

† *Ibid.*, p. 83.

Conclusions

This study has been made, not with the idea of creating anything new, but with the idea of bringing before the state school officials the facts that exist concerning the phase of special education which at present is being most neglected of all of the phases of special education now being undertaken by the state system of public education.

Tennessee should formulate a sight-saving class program as an integral part of the state educational program, just as has been done with other handicapped groups, for the following reasons:

1. The training of children of low vision in sight-saving classes passed the experimental stage in other states many years ago, and this gives our state a chance to profit by the experience of some of the best school systems in the country. The slow process by which the work was added by the various systems is evidence of its significance. It is by no means a new fad.

2. There is no serious argument against sight-saving classes as a means of special education. No state has ever offered any other way of educating these visually handicapped children quite so efficient or economical, to take their place. Then there is only one alternative for Tennessee so far as this group is concerned.

3. The state is responsible to its citizens. Tennessee should provide a form of education for visually handicapped children that teaches them to overcome their handicap. Only one way of accomplishing this has ever been offered: through sight-saving classes.

4. Only about .4 per cent of the estimated number of children with low vision are being reached by the state educational program. This fact is alarming and is a matter of concern that demands immediate attention.

5. If the state cannot do something about this situation, the compulsory school law should be revised.

6. The proper sight-saving program beginning with preschool age will have a tendency to eliminate the necessity for this type of special education. This sort of program will teach children of normal vision how to conserve their vision, thus eliminating eyestrain.

Recommendations for Sight-Saving Class Program in Tennessee

In view of the preceding chapters, it is recommended that the following paragraphs serve as a basis or guide in formulating a bill to be presented at the next session of the General Assembly:

The management and control of all sight-saving classes, established in the various county, city and special school districts of Tennessee, shall be vested in a state director of special education.

The director of special education shall distribute or cause to be distributed books and other sight-

saving supplies to schools not able to maintain sight-saving classes to be used by children who have some temporary defect of the eye and who may be recommended to the director of special education by a recognized eye specialist. Such books may be sent from one school to another as the director of special education sees fit to direct.

The director of special education may arrange with any local board of education, which maintains a sight-saving class or classes designated to receive non-resident children, to pay for the board of any such children described under this act under such standards and with such restrictions as the director of special education may prescribe.

If a child of one district attends a sight-saving class in another district, the board of education of the district in which he resides may pay his tuition in a sum equal to the tuition in the district in which such class is located for a child of normal needs of the same school grade. Upon direction of the director of special education the board of education of the district in which such child resides shall pay for his transportation and tuition.

Any child not reasonably close to a district maintaining a sight-saving class may be assigned by the director of special education to a sight-saving class in the Tennessee School for the Blind. The board of education of the district in which he resides may pay his tuition in a sum equal to the tuition in Nashville for a child of normal needs of the same school grade.

The director of special education shall prescribe standard requirements for sight-saving classes, which requirements shall include the conditions under which such classes shall be conducted, the methods of instruction and supervision, the qualifications of teachers and the conditions and terms under which they are employed, the special equipment and agencies for instruction provided, and the conditions of the rooms and buildings in which the classes are held.

The director of special education shall allow any local board of education maintaining a sight-saving class or classes an amount up to $2,000 for equipment for each class maintained, such equipment to consist of lighting fixtures, desks, typewriters, clear type books, maps, globes, and any other equipment designated by the director of special education.

At the close of each school year, the board of education maintaining a sight-saving class or classes, or which has boarded sight-saving pupils or has transported any sight-saving pupils as provided in this act, may certify to the director of special education the names and residences of pupils instructed in such class or classes and the period of time each was instructed, and the names and residences of the pupils boarded or transported as provided under this act and the period of time each was boarded or transported; and the amount expended for special appliances and the current operating cost of the education of such pupils, together with statements showing the per capita cost of the education of normal children in the district in the same school grades during the same period of time.

The director of education, upon receipt and approval of the report

and financial statement provided in the preceding paragraph, shall present a voucher to the comptroller of the state in favor of the board of education in an amount equal to the cost of maintaining such class or classes, minus the cost of the instruction of the same number of children of normal needs in the same school grades of the district. He shall include in the voucher the cost of boarding pupils included in the provisions of this act at the rate of not to exceed $225 for each pupil so boarded for nine months during the school year or each fractional part may be calculated on the same basis. He may also at his discretion include the costs of transportation as provided in this act.

ELLIOTT STANLEY FORD

Contact Glasses*

Contact lenses are held in place on the eyeball by capillarity. When properly fitted, they actually form a part of the eyeball, and move together with the eyeball in all directions. In the event of a blow against the eyeball the contact lens will be displaced together with the eye in the direction of the blow, and even if the blow is very severe there is no more chance of the contact lens breaking than there is of the eye itself bursting.

Contact lenses therefore are actually a protection for wearers of spectacles who indulge in violent sports. For instance, a person whose glasses might be struck by a squash racquet would be in great danger of sustaining a perforating injury to the eyeball from a piece of glass, while for a person wearing contact lenses such a danger does not exist.

This theoretically formed opinion is confirmed by practical experience in that so far not a single injury has been reported from a broken contact lens, in spite of the fact that many thousands are today wearing contact lenses. As a matter of fact, experiments performed, for instance, by Erggelet show that foreign bodies, flying against a contact lens fitted to the eye, do not produce severe injuries. On the contrary, it is obvious that contact lenses provide better protection than spectacles against small foreign bodies (dust, rust, small particles of steel) which do not produce perforating injuries. While they may enter the superficial surface of the cornea, they will not be able to enter the solid contact lens.

In cases of keratoconus there might sometimes occur a harmless erosion of the cornea if the contact glass is worn too long, but this rare happening is certainly not a contraindication when one considers the tremendous optical help which patients with keratoconus derive from contact lenses. In addition, I should like to mention that there is a well-founded opinion that contact lenses may retard the development of keratoconus.

HERMANN M. BURIAN, M.D.
Dartmouth Medical School,
Hanover, N. H.

* Extract from a letter.

News of State Activities

THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Brief and timely items only can be used, because of the limitations of space

A VERY warm response, including many practical offers of co-operation as well as endorsements of the idea, resulted from our request for news material for this department. Offers to provide information regularly have been received from fourteen state health departments, fourteen commissioners for the blind or departments of public welfare, five state medical societies, and five state organizations for prevention of blindness.

We hope before the end of the year to offer the same opportunity to other local organizations, such as departments of education, sight-saving class groups, local safety councils, and parent-teacher and other voluntary agencies who have adopted some aspect of sight conservation as part of their programs.

The following are items gleaned from material submitted:

Delaware

". . . The talking slide film, 'The Nurse's Responsibility in Preventing Blindness and Saving Sight,' has been used by us for staff education purposes. We have also made the film available to the schools of nursing in Delaware, and to the Visiting Nurse Association staff.

"We are planning to use the film in connection with teachers' meetings. We have not done so as yet, because we believe it will be necessary to prepare for its use through the distribution of some literature on sight saving.

"Dr. Woodbridge E. Morris, Director of Maternal and Child Health, is preparing a pamphlet for distribution. He discussed such a pamphlet with Miss Mumford when she was here in January . . ."

—*Delaware State Board of Health, Dover, Delaware*

Kansas

"The Kansas Association for the Prevention of Blindness, the Lions Club of Wichita and many of the public-spirited citizens of Wichita are pressing the matter of advanced legislation for the blind at the session of the Legislature at the present time. The Legislative Committee of the Kansas Association, of which Mrs. W. J. Logan is Chairman, has been in conference with the Committee on Social Welfare of the House of Representatives for some weeks and this Committee is now framing its measure. The following program* has been pressed:

"More money for social welfare out of the sales tax.

"Program for sight-saving classes in public schools.

"Continuance of the restoration of sight program.

"Adequate budget for the foregoing program.

"It is believed that the above program will be enacted into law without serious change.

"In the office of the State Director of Public Welfare, one day this week, the writer was told by the assistant director that the father of a boy now in the sight-saving class in the Wichita Public School came into the State Office and said that he wanted to make a plea for the continuance of that work. He said he had never seen such a change made in any child as his boy had undergone as a result of his year in that class. The dismal outlook on life that the boy had had prior to his entrance in that class had been changed into a joyous and happy and normal one. The world became altogether a new one. Life took on an entirely new meaning."

—*Kansas Society for the Prevention of Blindness, Wichita, Kansas*

Missouri

"The purpose of this note is to call attention to the great number of persons who appeal to the Missouri Commission for the Blind

* Only items relating to sight conservation presented here.

for eye care from nearby areas *immediately following* the holding of a diagnostic eye clinic. Because our prevention of blindness activities are confined almost entirely to the rural districts and patients have to come long distances to the clinic, notices and advance publicity regarding the clinic are confined to a single county. But, as soon as the clinic follow-up work is begun, word-of-mouth publicity spreads rapidly to the adjoining counties. Indigent persons want to know how and where they can get their eyes 'doctored,' and health and welfare workers ply us with requests for diagnostic clinics for their counties.

"Although the prevention of blindness department of the Missouri Commission for the Blind during 1937–1938 arranged for 7,720 eye examinations, 458 eye operations (paying for hospitalization), and for 6,365 refractions (paying for the glasses), at the close of the biennium there were in our files 10,102 written requests for eye care that had either not been granted, or where further eye care was indicated . . . .

"In an effort to arrange eye examinations for these 10,102 patients, it was necessary to discontinue the holding of diagnostic clinics and concentrate on these requests. Intensive work by the prevention of blindness field workers has been done in the counties where the greatest number of appeals for eye care emanated."

—*Missouri Commission for the Blind, St. Louis, Missouri*

New York

"The course entitled 'A Survey of Eye Conditions' (4 points credit) will be available to students planning to attend New York University summer session. This course, offered by New York University since 1932 in co-operation with the Bureau of Services for the Blind, New York State Department of Social Welfare, has become increasingly popular because of the material offered relative to sight conservation and prevention of blindness. It is designed for workers in the fields of education, social welfare, public health nursing, and allied fields. It is planned to present a background of the conservation of sight, together with an appreciation of the medical, social and educational needs and responsibilities in relation to acute and chronic eye conditions. Lectures will be supplemented by clinic demonstrations.

"Please address inquiries regarding registration to Mr. James Meyers, Director of Course, School of Education, New York University, Washington Square, New York City."

—*New York State Department of Social Welfare, New York, New York*

Tennessee

"During the ten and one-half months in which this Division has been carrying on its work, the following things have been accomplished, of which it is justly proud—66 persons have had their sight restored in whole or in part in one or both eyes, of which 36 have been children, 30 adults. Fourteen persons have had operations to restore sight, of which one has apparently been a 'failure'; five persons have had six operations to prevent blindness, of which one has apparently failed, for a total of 20 operations to restore sight and prevent blindness . . . .

"At the present time this Division is utilizing six definite approaches to the prevention of blindness and conservation of vision—namely, eugenics, legal, educational, medical, sight-saving classes, and the preschool illiterate vision-testing approach. These methods are being utilized not only through the medium of speech but through the press, moving pictures, radio talks and the printed pamphlet. This Division is now engaged in the preparation of a booklet which will carry all essential information in regard to the prevention of blindness and conservation of vision, and about all the causes of blindness prevalent in Tennessee, and written in a language which the laity will be able to understand . . . ."

—*Division, Prevention of Blindness and Conservation of Vision, State of Tennessee, Department of Institutions, Nashville, Tennessee*

Texas

". . . The nature of our work is as follows:

"1. Prevention of ophthalmia neonatorum by the furnishing of silver nitrate ampules to the city and county health officers and the midwives, by instructions to and supervision of midwives, and by instructions to expectant mothers by our local health services.

"2. The treatment of syphilitic keratitis and co-operation of the practising physicians throughout the state. We have established a number of venereal disease clinics in our larger cities and are

furnishing arsenic and bismuth to physicians throughout the state for indigent cases.

"3. General attempts at conservation of vision. Our efforts along this line are limited to the finding of visual defects in school children and other examinations, urging the parents of these children to have such defects cared for. At the present time there are no clinical facilities available through this department.

"It will be extremely difficult for us to give you an accurate statistical report upon all phases of this work, but we will be happy to co-operate with you in any way we can, conforming, of course, to our general policies."

—*Texas State Board of Health, Austin, Texas*

Note and Comment

Research Program in Trachoma.—According to an item appearing in a recent issue of the *Archives of Ophthalmology*, the Indian Medical Service has set up a research program in trachoma under the supervision of Dr. Polk Richards and Dr. Fred Loe, of the Indian Medical Service, and Dr. Phillips Thygeson, of the Eye Institute, New York. The committee will carry on research treatment of trachoma with sulfanilamide and sulfanilamide derivatives. A comparative study of therapy with sulfanilamide and antimony and potassium tartrate will be made by Dr. Julianelle, of St. Louis, in co-operation with the physicians in the Indian Medical Service.

Greater New York Safety Conference.—The subject of sight conservation in industry was made a significant part of the program of the annual convention of the Greater New York Safety Council, in which the National Society for the Prevention of Blindness regularly participates. The Society this year not only is maintaining an exhibit booth, but is co-operating in a half-day's program, "Vision and Eye Protection," under the chairmanship of Dr. Leonard Greenburg, executive director of the Division of Industrial Hygiene, New York State Department of Labor. The program for this section reads as follows:

"The Head and Eye Protection Code of the National Bureau of Standards"—M. G. Lloyd, National Bureau of Standards, Washington, D. C.

"Fifteen Years' Progress in Eyesight Conservation in Industry"—Louis Resnick, director industrial relations, National Society for the Prevention of Blindness, New York.

"The Industrial Eye Protection Program: How Is It Set Up? How Is It Put Across? How Is It Kept Across?"—Harry Guilbert, director of safety, The Pullman Company, Chicago.

It is expected that a forthcoming issue of the REVIEW will present these papers as a symposium, and that reprints will be made available upon request.

Another aspect of sight conservation presented during the con-

vention was the subject of industrial lighting, under the chairmanship of D. W. Atwater, president of the Illuminating Engineering Society.

Preventing Babies' Sore Eyes in Illinois.—A current issue of the *Illinois Health Messenger* says: "Silver nitrate solution sufficient to give prophylactic treatment to the eyes of 166,052 newborn babies was distributed last year. The general use of this preparation has practically eliminated ophthalmia neonatorum, an infection of the eyes at birth which formerly accounted for about 20 per cent of blindness in children.

"This is an increase of 24,627 over the amount distributed in 1937."

Clinical Tests Show Degrees of Night Blindness.—Incident to a report of the case history of a night-blind patient materially relieved by administration of concentrated doses of Vitamin A, a Liverpool hospital reporting in *The Lancet* affords an interesting description of the procedure and equipment employed in determining the degree of visual deficiency in patients complaining of night blindness. Although such persons may have normal daylight vision, night blindness characteristically becomes apparent only in darkness *after* exposure to light. In mild cases, the eyes require something over 30 seconds to adjust following a sudden change from light to darkness, whereas a severe case, such as is described in the article cited, may require as long as 85 seconds. These figures may serve to explain, but can only emphasize, the much-publicized dangers of night driving involving, either as motorist or pedestrian, persons so afflicted.

In tests employing a device known as the Biophotometer, the subject, looking into a lightproof eye-piece, gazes for a given period at a single illuminated standard lamp. Following this exposure, the light is switched off and in its place appears a group of five lights of varied intensity, so arranged that two which are dim and two which are brilliant are ranged on either side of a fifth of intermediate brightness. This quincunx will not be immediately visible to the night-blind subject, whose measure of adaptation is determined by the length of time necessary for him to perceive the central intermediate light.

The third step in testing is to show the same group of five lights, gradually dimming them until the center light becomes invisible to the patient and measuring the time elapsing from exposure to the moment when the subject can no longer perceive the central light. The longer the period, the more severe the degree of night blindness.

It is reported that, in spite of the tendency of patients to "anticipate" the appearance or disappearance of the lights when tests must be repeated, with conscious co-operation on the part of the subject it is possible to maintain a high degree of accuracy in recording adaptation time.

Brazil Forms National Society for the Prevention of Blindness.—Word has been received from Brazil of the formation of a Brazilian National Society for the Prevention of Blindness under the sponsorship of the Brazilian Society of Ophthalmology.

The Brazilian society indicates that it expects to follow the general outline of the program as carried out in the United States.

Society's Talking Slide Film Active in State Programs.—Within the approximate length of six months' time, the Society's talking slide film, "The Nurse's Responsibility in Saving Sight," has received wide distribution—there have been 30 sales in 17 states and the District of Columbia, Hawaii and England. Represented in the states are ten state health departments; four state welfare departments; six local public health agencies; two schools of nursing; two local prevention of blindness agencies; as well as a number of other groups.

Writing on the Society's talking slide film as a medium of education, an instructor of nursing education said:

"The pictures are excellent and the accompanying lecture is varied, some explanations being given by the doctor, others by the nurse. The content has been well selected to give a comprehensive view of the causes of blindness and the function of the nurse in preventing blindness from each of these causes. The provision for interrupting the record, allowing for further discussion and explanation at any point in the film, adds to its value as a teaching device.

"My experience in the use of the film showed it to be stimulating and instructive for both graduate and student nurses."

Current Articles of Interest

Observations on the Action of Paredrine Hydrobromide Ophthalmic Solutions, Lyle S. Powell, M.D., and Marshall E. Hyde, M.D., the *Journal of the Kansas Medical Society,* December, 1938, published monthly by the Kansas Medical Society, Topeka, Kansas. The authors provide the following summary: "Paredrine hydrobromide one per cent solution produced a uniform increase in the size of the pupils amounting to two millimeters or more in a group of patients between 16 and 30 years of age, and in another group of patients between 50 and 70 years of age. This mydriasis showed a tendency to subside four hours following drug administration in both groups. There was observed a slight but definite tendency toward a decrease in accommodation in both groups during the mydriasis."

An Aid Toward Correctly Inserting Contact Lenses, Joseph I. Pascal, M.D., *Archives of Ophthalmology,* March, 1939, published monthly by American Medical Association, Chicago, Ill. Although insertion without orientation is comparatively simple with a contact lens having a uniform scleral curvature with a round corneal section set in the middle, and an oval lens with radically different horizontal and vertical diameters is readily placed on the sucker and inserted either by the physician or the patient, Dr. Pascal suggests a simple and practical means of insuring the correct insertion of contact lenses having different scleral curvatures in different directions, and/or an oval corneal section centered or decentered in the scleral circumference.

Since the finely etched line usually placed on the inner, nasal side of most contact lenses is virtually invisible to the physician once the lens has been placed on the sucker, and also to the patient inserting his own lens once he has looked away after first determining its position, the lens may be thrown off its proper horizontal position through accidental rotation of the sucker in the hand as the lens is being conveyed to the eye. The author, therefore, suggests the practical expedient of marking one-half of the top of the rubber

sucker with a white line of adhesive tape which will serve as a conspicuous guide. Placed on the sucker with its etched line exactly aligned with the white marker, approached to the eye with the white strip directed toward the inner canthus, and visible between the cases of the fingers, the lens is correctly inserted.

Light Adaptation at the Fovea for Normal Eyes, W. D. Wright, D.Sc., A.R.C.S., *British Journal of Ophthalmology*, January, 1939, published monthly by the British Journal of Ophthalmology, Ltd., London, England. Author describes a new model of subjective photometer which records the effects of adapting the eye to a given intensity, and analyzes tests on 100 observers. The results are discussed in relation to susceptibility of different observers to glare; to photo-chemical reaction in the retina, and to reaction to the method for pathological investigation.

Methods of Testing for Colour Vision and Theoretical Deductions From Observations on Colour Vision, H. E. Roaf, M.D., D.Sc., *The British Medical Journal*, August 27, 1938, published weekly by the British Medical Association, London, England. The author concludes: "In this paper an attempt has been made to point out the difference between normal and defective colour vision, to describe the means of detecting defects in colour vision, and the possibility of compensating for defects in colour vision by binocular fusion of colours. The usual type of defective colour vision is a failure to distinguish red, yellow and green—that is, red-green confusion. There is no failure to distinguish blue from green. We can say that the normal person and the hypochromat distinguish blue from not-blue. The normal person distinguishes red from not-red. That which is neither red nor blue is called green. The hypochromat does not distinguish red from not-red, and anything which is not blue he tends to call yellow, as this is the brightest part in the not-blue region of the spectrum."

Vision in Nature and Vision Aided by Science: Science and Warfare, the Rt. Hon. Lord Rayleigh, *Science*, August 26, 1938, and September 2, 1938, published weekly by the American Association for the Advancement of Science, New York. A discussion of the structure and functions of the eye with special reference to artificial

aids in improving vision, such as spectacle and telescope lens and improvements in color discrimination.

Second Annual Summary of Fourth of July Injuries Due to Fireworks and Explosives; Second Series (1938); *Journal of the American Medical Association*, Vol. XII, No. 3, January 21, 1939. In summing up the study, the following comment is presented:

"More striking than ever is the evidence in 1938 that many regions are woefully lacking in adequate legislation for the prevention of injuries and fatalities from fireworks. Numerous states and cities have shown serious increases in recorded accidents. In general only those states which have enacted and enforced state-wide laws have shown any evidence of satisfactory control. Some of the states with anti-fireworks legislation have failed to realize the benefits which might have been expected because of the lack of such legislation in neighboring territories and the ease of transportation. With the high incidence of injuries from fireworks continuing unabated in spite of the knowledge of how to overcome this danger, there is no longer any excuse for failure to adopt effectual state legislation."

The Position of Orthoptics in Headache from Eyestrain, J. D. Maude, *Medical Journal of Australia*, February 11, 1939. Writing on orthoptics, Dr. Maude presents the following interesting comment on blinking:

"I have not yet made a sufficient number of examinations to enable me to make more than a few suggestions about blinking in children; but I believe that blinking is caused as much, if not more, by binocular discord as by errors of refraction. After refraction is tested, whether glasses are prescribed or not, a child whose parents complain that he blinks, screws up his eyes, tilts his head, or reads with his face almost on the page, should be examined with an amblyoscope. It is necessary to find out to what extent the child is master of his binocular vision. In most cases phorias that are detected in later life must have been present during childhood. Squinting and blinking begin at the same age. Possibly squints are manifestations of failure to master the binocular mechanism, and blinking and allied symptoms are the earliest signs of heterophorias, including inadequate convergence. . . ."

Book Reviews

TEXTBOOK OF EYE, EAR, NOSE AND THROAT NURSING. Abby-Helen Denison, R.N. Revised by Lyyli-Eklund, R.N. New York: Macmillan Co., 1938. 367 p.

The first eight chapters of this revised text deal entirely with the eye, emphasizing the nursing procedures carried out in the care of eye patients. Only this first section of the book will be considered in this review.

There is a concise description of the anatomy and physiology of the eye which, supplemented by a more detailed anatomy text, should give the student nurse an adequate understanding of this basic topic. The diseases of the eye are subdivided according to anatomical structure, and clearly described. The drugs commonly used in the treatment of eye conditions are named and classified and their method of use explained. A detailed description of nursing procedures is given, with emphasis on the necessary careful handling of the eye and care of equipment. Various types of bandages and dressings are described with illustrations. There is one chapter dealing briefly with the surgical equipment and its care, and another with the duties and responsibilities of the nurse in the out-patient department. The chapter on the hygiene of the eye is a much needed addition to the text, but requires amplification.

The reviewer believes that in eye nursing the psychological problems are so numerous that any text on the subject should give a definite place to the mental care of eye patients. This has not been done.

The logical sequence of arrangement, the clearness of presentation, and the suggested references make this a book which is easily used and valuable both to the student and to the instructor.

—CORA L. SHAW, R.N.

DOCUMENTA OPHTHALMOLOGICA: A SYNTHESIS OF RECENT ADVANCES IN OPHTHALMOLOGY, Volume I. A. J. Schäffer, editor. Zurich: Masson and Co., 1938. 482 p.

The mass of world medical literature issued weekly, monthly, bi-monthly, and annually has reached such enormous proportions

that it has become quite impossible for the most voracious reader to devour it all. As to the practical work-a-day doctor who must devote some of his time to his clinical duties, much valuable material must inevitably escape his attention. While he might, therefore, look a little askance at any journalistic addition to the ophthalmological output of new matter, the present publication will come rather as a relief, as it is designed to be a summary of all of the important and new work bearing on this specialty throughout the world. Practically all of the ophthalmic periodicals present abstracts of relevant literature. These are necessarily so brief that, while they are of informative value as to what is being done, the interested reader must seek the original sources if he wishes a comprehensive understanding of the matter presented.

The purpose of the *Documenta Ophthalmologica* is to synopsize in a single rather complete article all that is worth while that clinical and laboratory research has brought to light.

The section pertaining to the eye is but one of a series of similar publications, including those on oto-laryngology, obstetrics and gynecology, dermatology, neurology, and psychiatry. Under the editorial supervision of Dr. A. J. Schäffer, together with such names as those of Adler, Bailliart, Duke-Elder, F. P. Fischer, Granit, Hecht, Heine, Magitot, Wald, and Weve, the thoroughness and scientific value of the subjects reviewed will be assured. The topics which appear in the index of the first volume are all of living and practical interest. Ragner Granit, professor of physiology at the University of Helsingfors, occupies 72 pages in reviewing the "Processes of Adaptation in the Vertebrate Retina in the Light of Recent Photo-Chemical and Electrophysiological Research," to which is annexed an extensive bibliography, a subject of great interest today because of the effect of a deficiency of vitamin A on the visual purple and dark adaptation. Of no less present-day value is the 81-page review of "The Water Content in the Eye and its Distribution," by Professor Fischer of Utrecht. Equally vital are the 91 pages given by Bailliart of Paris in his studies of "The Retinal Circulation" and his clinical evaluation of the various forms of hemorrhage which may be presented.

Karrer of the Chemical Institute of the University of Zurich occupies 88 pages in a résumé of the importance of "Keratoinoid"

in connection with the eyes, which most fittingly goes with Dr. Schäffer's summation in a dozen pages of "The Vitamins in Ophthalmology," both of which have a direct bearing on the extensive paper of Magitot (140 pages), on what is the most urgent problem in ophthalmology today and one which will soon be actively attacked, the symptomatology and the pathogenesis of glaucoma.

Equally important and timely is the presentation by Nordmann and Reiss from the Ophthalmic Clinic and the Institute of Physiobiology of the University of Strasbourg in the study of the problem of the "Opacification of the Crystalline from a Physico-Chemical Standpoint." Only an introduction to the subject is given in the 50 pages allotted to it, but readers will look forward avidly for fuller information on what the scientific world knows of cataract.

All of these studies are abundantly documented so that the student may easily seek the original sources for further verification.

The articles appear in one of the four principal languages, English, French, German, and Italian, and are made accessible to the entire ophthalmological world. The volume is well printed, but on glazed not mat paper, which would have made more comfortable reading. The subject matter is not printed at the top of each page, as is customary in medical periodical literature, so that it is somewhat difficult to determine where each article begins. Filling as it does a hitherto unsupplied need, it should prove a welcome addition to the literature of every progressive ophthalmologist.

—Park Lewis, M.D.

Psychological Optics, Vernon W. Grant, M.A., Professional Press, Chicago, 1938.

Vernon W. Grant has written a comprehensive review of the psychologic factors associated with the eye and its functions. Numerous references to the modern theories of visual psychology are appended. The book is written in a clear and concise manner and is useful for the student and practitioner. The book is well illustrated with diagrammatic drawings.

In the author's discussions of behavior, the visual reaction system, visual perception, attention, visual sensations and illusions of space, he has supplied an essential background for the proper understanding of certain visual reactions and their derangements.

The author has confined his discussion mainly to the psychologic aspects of optics and has refrained from too lengthy a discussion of the pathologic and physiologic considerations of the subject.

—Conrad Berens, M.D.

Prediction and Prevention of Reading Difficulties, Margaret A. Stanger and Ellen K. Donohue. New York: Oxford University Press, 1937. 191 p.

At a time when much attention is being given to remedial reading, it is exceedingly encouraging to have made available a book dealing with the much more important aspects of the problem, the prediction and prevention of reading difficulties.

The authors are concerned to find that after taking into consideration the possibility of eye or ear defects, low intelligence and other recognized reasons for possible failures in reading, an appalling number of well-endowed children suffering from none of these usually considered hindrances to reading present grave difficulties.

The authors are confident that before teaching procedures can be used efficiently an understanding of the theories of neurologists in regard to this problem is essential. Hence the theories of well-known specialists in this line are presented in their own words, accompanied by a simplified explanation.

In addition to a consideration of these, emphasis is laid upon family history and the authors present a wealth of material in the form of simple, inexpensive tests for young children that will aid in making predictions of possible reading difficulties sufficiently in advance of the time when reading is usually taught to eliminate the causes in cases in which this is possible, and in other cases to adapt methods to the particular needs of the child showing deviations. The latter part of the book presents suggestions of how predicting reading difficulties may help in their prevention.

Books Received

The 1938 Year Book of Eye, Ear, Nose and Throat, edited by E. V. L. Brown, M.D., Louis Bothman, M.D., and Samuel J. Crowe, M.D. Chicago: The Year Book Publishers, Inc., 1937. 631 pp. ill.

Co-operation Principles and Practices, Eleventh Yearbook, Department of Supervisors and Directors of Instruction, National Education Association. Washington, D. C.: 244 pp.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

286. Emotional Factors in Education of the Visually Handicapped, Eleanor L. Hearon. 8 p. 5 cts. Points out the emotional involvements as well as the educational, social and economic drawbacks of the visually handicapped. Reprinted from *The Sight-Saving Class Exchange*, February, 1939.

287. A Demonstration Eye Safety Lesson, given by the pupils in the advanced biology senior class, New Haven High School, New Haven, Conn. Reprinted from *The Sight-Saving Class Exchange*, April, 1939. 6 p. $2.00 per 100.

288. Development of the Normal Eye in Infancy and Childhood, Willis S. Knighton, M.D. 8 p. 5 cts. Ophthalmic information which all pediatricians should take into consideration in the care of their patients.

289. The Psychological Touch in Straightening Cross-Eyes, Meta Rosenthal. 8 p. 5 cts. In the treatment of cross-eyes, the parents and teachers as well as the oculist are responsible for preventing psychological complexes.

290. Injuries to the Eyes, Joseph Dessoff, M.D. 12 p. 10 cts. The eyes have become subject to injuries brought about especially by industrial hazards, and require consideration on the part of industry as well as medicine.

291. Sight-Saving Classes (An Excerpt from the German), Professor Dr. M. Bartels. 8 p. 5 cts. The similarities as well as the differences in sight-saving classes abroad and in America are brought out in this article, translated from the German.

292. The College Student and Dormitory Study Facilities, Anette M. Phelan, Ph.D. 12 p. 10 cts. Emphasizes the necessity for a continuous program of eye health during the college age, and presents a description of reading and study facilities conducive to good eye health.

293. An Evaluation of Vision-Testing Methods in Schools, John B. Hitz, M.D. 8 p. 5 cts. The author presents this useful evaluation of the various methods of testing vision in the schools—of special interest to school physicians, school nurses and teachers.

D124. Survey of Fireworks Accidents, 1938. Reprinted from the *Journal of the American Medical Association*, January 21, 1939. 7 p. $1.75 per 100. The 1938 review by the American Medical Association of Fourth of July injuries in the United States.

D125. Preparing the Handicapped Child to Live, May E. Bryne. Reprinted from *Public Health Nursing*, December, 1938. 8 p. The author emphasizes the necessity for considering the handicapped child as a normal human being, and discusses visual handicaps along with other physical handicaps requiring special educational facilities.

D126. Relation of the Ophthalmologist to the Pediatrist, Warren S. Reese, M.D. Reprinted from the *Pennsylvania Medical Journal*, February, 1939. 3 p. $1.75 per 100. Points out the various eye complications appearing in infancy and childhood in which the pediatrician and the ophthalmologist can cooperate to the best interests of their young patients.

Contributors to This Issue

Dr. Willis S. Knighton, a frequent contributor to the Sight-Saving Review, is a practising ophthalmologist in New York City.

Meta Rosenthal is a professional writer from Chicago, whose articles on scientific subjects have appeared in a number of popular and scientific magazines.

A practising ophthalmologist of Dortmund, Germany, **Professor Dr. M. Bartels** has long been especially interested in the advancement of the sight-saving class movement in Germany. **Dr. Harry S. Gradle,** a practising ophthalmologist of Chicago, Illinois, and vice-president of the Illinois Society for the Prevention of Blindness, edited the translation of the article by Dr. Bartels.

Dr. Anette M. Phelan, associate in health education of the Society, has emphasized the subject of eye health of college students among her activities.

Dr. Joseph Dessoff devotes his time to the practice of ophthalmology in Washington, D. C.

Dr. John B. Hitz is a practising ophthalmologist of Milwaukee, Wisconsin.

Book reviewers: **Cora L. Shaw, R.N.,** Institute of Ophthalmology, Presbyterian Hospital, New York, N. Y.; **Dr. Park Lewis,** first vice-president of the International as well as the American National Society for Prevention of Blindness; **Dr. Conrad Berens,** member of the Society's Board of Directors.

The Sight-Saving Review

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Table of Contents

Because of their omission for lack of space in this issue, the sections devoted to Note and Comment, Current Articles of Interest, and Book Reviews, will appear more extensively than usual in the September REVIEW.

The Rôle of Light In Education*

N. Bishop Harman, M.A., M.D., F.R.C.S.

OUR measure of desirable light, says the author, "has changed amazingly in recent years. . . The whole aspect of the school is vastly more cheerful, and so to the advantage of the children"

WHEN your President asked me to introduce this subject to you I thought for a moment that the case for good lighting in schools, colleges, and universities was so well established that there was scarcely need for further advocacy; all that could be said or done was to point to the great changes that have been witnessed in the last forty years. But this first thought of mine was wrong. I saw with my own eyes in a school in London, two months ago, in November, 1938, conditions of lighting that were familiar enough at the turn of the century, but which I thought had been abolished long since. In one of the wealthiest boroughs of London I came across a school of the non-provided type. The infants' department was below the level of the pavement, so that I could look down upon the children in the class. There was no teacher in the room. The children were doing some kindergarten work which certainly amused them. The afternoon daylight was that of November; little of it got into the room. The main source of light was from the gas fittings. The pendants were those I knew in my school days, vertical pipes with widespread, horizontal arms. It was clear that these had originally been fitted with naked fish-tail burners, but in this room they had been changed to naked incandescent gas mantles. Position, height, and diffusion were hopelessly wrong. The light at the desk level was less than one foot-candle. That class room remains the same today, in the year 1939.

In 1900 the possibilities and range of lighting effects were small

* Presented before the Medical Officers of Schools Association, January, 1939, and reprinted with permission from *Public Health* (London), March, 1939.

and limited. Today they are great and almost unlimited. Then it was impracticable to supply an illuminant giving 10 foot-candles in a classroom; now a supply of 50 foot-candles is easy, safe, and not costly.

The illuminating engineer has developed the power and intrinsic brilliance of illuminants to such a high degree that we are now usually less concerned with securing enough light than with making sure that the light is so arranged that it shall not be harmful to the eyes of the children. Too little light makes work fatiguing, but the weariness induced is of the sort that tends to make us cease trying to work. In the school the child becomes listless or lazy. Excess of light, or ill-arranged light, causes glare that is definitely distressing to the eyes, and through them to the nervous mechanism of the sufferer. In a classroom, whence there is no escape, the child is subjected to conditions that are little less than torture.

Reactions of the Eyes to Light

Light is only recognizable by eyes that see. A consideration of the conditions under which our eyes see cannot fail to fill us with wonder at their amazing adaptability to variant conditions. When we are out-of-doors on a clear, sunny day in some pleasant green field of this country, the light is something like 10,000 foot-candles; even in the shade of a tree or when the sun is hidden by thin clouds it may equal 1,000 to 2,000 foot-candles. Yet our eyes are happy in both conditions. When the sunshine is reflected from the paved street of the city or the waves of the sea, then our eyes begin to protest: tears flow, and an orbicular spasm may induce a temporary blindness. When the sun sets we illumine our homes and streets with lights that are miserably feeble in comparison with the daylight; two or three foot-candles is a fair average in the home, yet our faithful eyes adapt themselves to the altered circumstances, so that in these days we work and play as much by artificial light as we do by daylight, and maybe more.

The power of adaptation of our eyes is wonderful. It is a marvellous piece of automatic and precise adjustment. The adjustment is based upon the fact that the eyes themselves need a relatively small amount of light to see by, but they want that little light to be good. In the sunlight the pupils contract to their

smallest diameter to exclude excess of light, and in so doing they improve the accuracy of vision by cutting off spherical aberration just as does a stenopaeic disc or pin-hole camera. An eye with a dilated or paralyzed pupil is a constant source of annoyance to the owner.

In these days we naturally scorn a light measured by one foot-candle, but the light of a single candle at the distance of one foot, if it be properly shaded from direct exposure to the eyes, will form a perfectly satisfactory illuminant for reading ordinary print, as our ancestors knew full well. Most of us, I have no doubt, have read a newspaper by moonlight, by a light the measured value of which is perhaps no more than one-fiftieth of a foot-candle.

Again, the difference in the lighting in our rooms is balanced by our eyes. In the various parts of most rooms there may be a 90 per cent difference in the value of the daylight on the desks by the window and on the desks against the far side wall. Something of the measure of the difference of visibility can be gauged by the experience of the photographer: outside a building he can take an instantaneous photograph in a fraction of a second; inside he will need an exposure of minutes. Our eyes can do better than that, for within a few moments of our entry in the dimly lit building we can see as readily as we had previously done out-of-doors.

There is no doubt that sight, or visual acuity, is increased up to a point by the increase of light. This is recognized by ophthalmic surgeons, so that now there is a standard of lighting recommended for vision test cards, with the intent that the conditions of, and therefore the responses to, these tests shall be as nearly equal as possible. The improvement in the visual acuity advances up to a point. If the lighting be excessive, vision is reduced; for example, when we look from the back of a room at a sun-lit window, then we may be unable to see the mullions and transoms that cross it. This is an example of glare and of its disturbing effects. There has been an astonishing change in recent years in our appreciation of the correlation of light and vision. Uhthoff (1886) claimed that the visual acuity is highest when the illumination reaches 3.3 foot-candles; Ferree and Rand (1920) found it at maximum at 20 foot-candles; Burnap and Jackson (1928) found it improves up to 500 foot-candles; R. J. Lythgoe (1932), in a most exhaustive study,

saw it continue to improve up to and beyond 1,275 foot-candles; and Eguchi (1931) claimed that it improved with an intensity even greater than 7,750 foot-candles.

The Rôle of Education in Lighting

After this statement of the reactions of our eyes to light I propose to comment upon the reactions of modern authorities to a piece of ocular hygiene that was initiated by school doctors, or doctors interested in school work. In this section I would alter the title of my paper from "The Rôle of Light in Education" to "The Rôle of Education in Lighting." I think I shall be able to show that the endeavor of the school doctor to secure reasonable and good lighting for the school children has had a far greater effect than any one of the pioneers thought possible at the time of his work. The effect has spread far beyond the schools, and the advance secured is a notable instance of the inevitable contagiousness of a good example. From such a notable experience we may reinforce our efforts in our field of work, and encourage ourselves to carry on with that work even though at times it may seem that we are talking to authorities who are deaf or at least indifferent to our plea for improvement.

James Ware, an ophthalmic surgeon of London, and a Fellow of the Royal Society, is to be credited with the earliest recorded attempt at school medical inspection and inquiry into the state of the eyes of the children. In a paper written in 1813 he wrote: "With regard to the proportion between the numbers of near-sighted persons in the different ranks of society, I have taken pains to obtain satisfactory information, by making inquiries in those places where a large number in these several classes are associated together." He found those persons in the military barracks, in a Chelsea school for the children of soldiers, and in the colleges in Oxford and Cambridge. Among the conclusions he came to are two that hold good today. "That: near-sightedness is rarely observed in infants or even in children under ten years of age. It affects the higher classes of society more than the lower. . . ." But the effects of light upon the sight escaped his attention; he was more concerned with internal causes.

It was not until 70 years later we have any certain record of an

investigation into lighting conditions. It is to the enduring credit of Hermann Cohn that a real advance was made in the hygiene of the eyes of school children. In his book, which is quite small and written with commendable simplicity and brevity, his own work, and that of others of his time and before him, is set out. He has a chapter on natural lighting and one on artificial lighting. On page 131 he shows how systematic was his approach to the class-room. He writes: "In my investigation in Breslau I have drawn up a light-table for every classroom, based upon the following questions:

How many windows are there at the right, left, front, and back of the writer?
How many windows facing east, west, north, and south?
Of what color are the walls?
How far off?
Of what height and width are the windows?
In what story is the room?"

He regrets that "at that time there was no photometer" convenient for school work. But he found that, by comparing the lighting of two rooms, "the human eye itself is in some cases the best photometer." He names half-a-dozen other workers who had investigated schoolroom lighting. He plumps for the glass roof, following the lead of Javal of Paris. Of artificial lighting, he says it was by gas. "The flames were in no single case provided with a shade." He says it was nearly as bad in the University lecture rooms until after his report was presented.

I pass now to the beginning of this century, when school medical inspection was instituted in earnest in this country. It is significant that it began with the investigation of the sight of the children. In London Dr. James Kerr, who was then the medical officer of the School Board for London, set some half-a-dozen young ophthalmic surgeons to work in the schools, each for three half-days a week. I was one of them. Our work was the routine testing of the visual acuity of the children. But we are told that any relevant investigation might be carried out and counted as part of our work. This was a distinctly wise provision. The reports obtained led to a systematic investigation of school conditions. On page 29 of the

report for March 25, 1904, there is set out a table giving the results of some of these early investigations. The noteworthy feature of that table was the finding that, whereas in boys', girls', and mixed departments, natural lighting was satisfactory in the majority of classrooms, there was a heavy incidence of "bad" lighting in the infants' departments. My share in that work led to the publication, in the Report of the Education Committee of the London County Council in 1907, of an account of experiments carried out in artificial lighting of classrooms.

In 1909 the Illuminating Engineering Society (of London) was founded, and speedily got to work by means of committees and discussions, making recommendations for the improvement of lighting. In 1910 there was a discussion on "Glare, Its Causes and Effects." In 1911 the subject for consideration was "School Lighting." Natural lighting was introduced by Dr. Kerr, and artificial lighting by myself. This discussion was extended to the illumination of some London colleges by Leon Gaster and J. S. Dow. Similar work was being done abroad, notably by the New York Section of the Illuminating Engineering Society. Valuable work was done by Dr. P. W. Cobb of Johns Hopkins University and by M. Luckiesh. In 1913 there was a full-dress discussion on school lighting by the Association of Medical Officers of Schools Association, opened with an excellent paper by Dr. Elwin H. T. Nash, your past president. Then, in 1915, our own Illuminating Engineering Society presented a report of a committee, of which Dr. Kerr was chairman, on the daylight illumination of schools. That was one of the best accounts of the subject.

All these dealt with the subject within the limitations of lighting conditions then existing. It is of interest to note the rapid change in later years as the possibilities of artificial lighting improved. The report of the International Labour Office of the League of Nations in 1923 on the "Protection of Eyesight in Industry" shows how rapid an advance had been secured. Indeed, the qualities of artificial lighting had become so splendid that enthusiasts now arose in the United States of America who put forward the proposition that in ultra-modern buildings daylight might be supplanted by the superior constancy of artificial light!

But in this country there was a growing awakening to the value

of natural light. The architects began to take notice. In 1928 Mr. Percy J. Waldron wrote: "One would expect the architect to be an ardent student of illumination, and to devote more attention to its most perfect and powerful form of sunlight than to artificial light, and to study its more general form of diffused daylight even more than sunlight. Actually, however, the subject of illumination, certainly natural illumination, is, I believe, entirely absent from the curricula of architectural schools, while the knowledge and even the ideas of practising architects on the subject are often extremely hazy and meager."

That this deficiency was being corrected was shown by the "Code of Lighting School Buildings," the joint production in 1924 of American engineers and architects. This is still a valuable code. It was commented upon and extended in a paper by Dr. Kerr at the London Illuminating Engineering Society in 1926. Then there were reports on natural and artificial lighting, issued by a committee of the London Illuminating Engineering Society in 1931, on which there were representative architects, doctors, engineers and teachers. Most significant was the publication of a series of reports by H. M. Stationery Office in 1931–33: *The Illumination Research Technical Papers*, on the seasonal variation of daylight; daylight required in offices; and the penetration of sunlight into buildings. In 1933 the Royal Institute of British Architects issued a report on the orientation of buildings which dealt specifically with schools. By 1937 good lighting had become of such general interest that a London daily newspaper, the *News Chronicle*, instituted a schools' competition, the results of which were published in the *Architectural Journal*. Finally, Parliament has taken a hand in the cause of good lighting. Section 5 of the Factories Act of 1937 demonstrates this. One paragraph reads: "Effective provision shall be made for securing and maintaining sufficient and suitable lighting, whether natural or artificial, in every part of a factory in which persons are working and passing." The fourth report of the Departmental Committee (Home Office) on "Lighting in Factories" is a most valuable document, and might well be studied by all school doctors. Some of its recommendations (iv, v, vi) relating to glare are wholly applicable to school conditions.

Such a sketch as I have given of the history of the growth of the

appreciation of good lighting is not meant to be inclusive. It is meant to show broadly the steps of recent advances. It is meant to show how the work initiated by school doctors for the benefit of the children has spread far and wide so as to include all sections of the community. It is meant to show how the grain of mustard seed grew and waxed into a great tree, all-embracing in its wide circumference. Such a demonstration is of the highest importance to school doctors. Much of their work is of a routine character. But there is always present the possibility of a new idea being generated, when observation and thought are brought to bear upon the work. The school doctor is in truth an educationalist, with an influence far beyond the limits of his schools. The lesson he and his kind taught on school lighting has been learned by the world at large. This is a demonstration of the rôle of education in lighting.

Daylight

Now I propose to sum up some of the conclusions of recent observations upon lighting, especially as these apply to schools.

Daylight must always be of first importance in a school. Artificial light is altogether secondary. Indeed it might be quite practicable educationally to carry on an efficient school without any artificial light. There would be a rule that school work needing reading, writing, or sewing should be done only when there was good daylight, and that when this faded the curriculum should be limited to such lessons as could be given by the voice of the teacher, or to drill, physical exercises, and games. But I take it that with examinations ahead such a rule would be held to be utopian. Nevertheless the point stands. Daylight is the first need for school work, and when that fails close work should be as limited as possible.

"A school should be so placed on a site that no shadow can fall upon the buildings and every available ray of sunshine can play around and enter them." That is a passage from an architects' report. The proposition is quite practicable for country and suburban schools; for town schools it may be impossible. The importance of the statement lies in the fact that the position of the school is the determining factor. Once built, the school and its daylight are fixed. Artificial light we can alter with ease. Struc-

tural alterations are usually prohibitive. The difficulty of the placing of town schools is great. It affects particularly the infants whose eyes are young and tender, and more liable to fatigue than those more grown. The infants must have the lowest floor of a building, for they cannot go up and down stairs easily or safely. The ground floors of town buildings are the worst lighted owing to the nearness of other buildings. There is one way of meeting the difficulty. It is by abolishing the classrooms on the ground and making this into a covered arcaded playground, a most useful provision in bad weather. The approach for the infants to their first floor rooms would be by a ramp. Some day, when lifts are completely safe, the infants will be given the top floor.

The aspect of school buildings is not easy to decide. In winter and spring sunlight in a classroom is pleasant, cheerful, and warming. The idea that by the provision of special glass the sunlight can have other effects is, I believe, fanciful. Glass soon gets dirty, and glass changes its quality, so that special permeability is lost or reduced. Summer sunshine in a classroom is a discomfort. Suitable blinds are hard to obtain, they get out of order, and when they are down the room may be stuffy and dull. The general opinion is that the classroom should have a southeast aspect, so as to get the morning sun, but not much of the midday or afternoon sun. An exception seems desirable in schools on our northeast coast where a south or even a southwest aspect might be comfortable.

Since the majority of our schools must be in or about town, windows should be designed to receive light from possibly limited horizons. The nearer to the ground the floor level of the room, the higher should be the ceiling, and the windows should be carried to the ceiling level. Any blind fittings should be recessed into the ceiling. Transoms and mullions should be reduced to the minimum, and there should be no architectural embellishments in the upper part of the window; Gothic arches and tracery are evils in a classroom. The upper part of the window is the most efficient source of light—screening the top of a window darkens a room far more than the screening of an equal part of the bottom. The windows should be related to the use of the room and not to the exterior elevation. They should be on the left-hand side of the children's

desks and occupy the rear two-thirds of the wall. A sill four feet from the floor is convenient. Windows on both left and right sides are advocated so as to secure free cross-ventilation. With such provision the right-hand windows should be high up and serve as openings rather than lights.

The craze for ultra-modern windows characterized by the broad low fenestration is to my mind wholly bad. It is evident that in towns, rooms with such windows must be dark all day a few feet away from the window, and need artificial light all day and every day. There is much more sense in the tall windows of our eighteenth century houses in Harley Street!

Skylights give more working light than a window of the same glass area. Small skylights give hard contrasts, the angles of the room are dark and gloomy, and the whole effect of the room is prison-like as compared with windowed rooms. Also, unless the glazing of a skylight be doubled, there is a bitterly cold down draught in winter time which is most chilling. Skylights are convenient for art rooms, and even then the factory type of vertical roof lights facing north is preferable.

Clear colorless window glass is best. Plate or thick glass has its value in town as a noise muffler. Where obscured glass is needed, what is known as "cathedral" glass is better than ground or ribbed glass for it can be kept clean.

An "open air school" should theoretically be free of any difficulty about windows. Practically it is not. Shelter is imperative. An open side to a shelter is a window. An absence of glazing may be pleasant in summer; it is not so in winter. The exposure makes ample clothing a necessity. Experience shows that "children are much happier and more responsive when lightly and freely clothed in a room which is healthily warm and draught-protected, adequately but not excessively airy, than they are when heavily clothed in a room with cold air currents." Again, in damp-laden atmosphere there is no certain advantage in all-the-year-round open-air teaching, except to tubercular subjects who would be better provided for in the country. In a book written by a zoologist on an antarctic expedition I found this sentence: "When the fingers are helpless with cold, the mind becomes helpless too."

Large buildings are sometimes planned with what are ironically

called "light-wells." These are outmoded by the recessing of the façades of the buildings, as has been done in the splendid head office of the London Passenger Transport Board in Westminster, and as is being done in the new section of the British Medical Association House.

Outside reflecting surfaces are of doubtful value in town. Just when they might be of most service in the winter time, they become most dirty with the smoke and fog.

Wall Colors

The internal planning and finish of ceiling and walls are of high importance. Rooms should be long on the window side. A useful plan to have in mind is this: each room should comprise a children's square with its left-hand main windows. Extending this is a teacher's annex, lighted so far as daylight from the children's windows; in this part is the teacher's dais and desk, the blackboard, cupboards, maps, and the door. Inevitably the direction of the light is imperfect for the teacher, but he or she is not constantly seated.

Whitewashed ceilings are better than painted. Wall surfaces should be matt finished. The color is important. Here are the findings of reflecting power in percentages: White 84, ivory 77, pearl 73, stone 68, light green 63, buff 60, ivory tan 56, shell pink 51, French grey 40, sky blue 36, tan 28, olive green 21, cocoanut and cardinal red 16, dark green 15. Above a darkish dado a light wall tint is desirable. Tastes will differ. Personally I like ivory white above and a red dado. The combination is fresh and cheerful.

The hall is an integral part of a modern town school. Its natural lighting and its cheerfulness of aspect is of lesser importance than the classrooms. It may well be on the north side of the building, and cheer be given by suitable artificial light and the display of colored pictures.

Artificial Light

Artificial lighting, in recent years at any rate, has been a popular subject of inquiry—not because of its primary importance, for that place is held by daylight—but because of the splendid strides of recent advances in artificial lighting; because of the variety of

its possibilities; and because of the relative ease with which installation changes may be made.

Lamps.—Some village schools still depend upon paraffin lamps, though in England the number is falling with the extension of rural gas and electric services. A central draught spreader paraffin lamp with a well-shaped domed opal glass reflector will give a first-class light. But cleanliness and skill in trimming the wick are imperative; also care is needed for the first few minutes after lighting, for these lamps are liable to flare up and fill the room with soot. Where lamps are in use it is better to use them only for the purpose of general vision, and to exclude close class work for the time; so that the rule for infants' classes should apply in rural schools to all departments.

Gas.—The introduction of the Welsbach mantle revolutionized gas lighting, and the later high-pressure and superheated low-pressure inverted gas burners are as perfect forms of gas lighting as could be desired. The gas mantle has one advantage over the electric filament, in that its intrinsic brilliance is lower; shades and reflectors are therefore more easily adapted. But gas has the disadvantage of its heat and consumption of air. Pendants with opal glass shades whose sides meet at an angle of 80° to 90° form an ample background to the light. There is no need to enclose the mantle. In my opinion it is better to fit a number of separate pendants with one burner each than to group burners within a few large fittings.

Electricity.—The superior convenience and adaptability of electric light, its cleanliness, coolness, and absence of air consumption, are unquestionable. The modern gas-filled (half-watt) lamp is a splendid servant when it is properly mastered, but short of this it is a danger because of its high intrinsic brilliance. One has only to glance for a moment at the naked glowing filament to be painfully convinced of this. Pearl glass bulbs should be the rule everywhere in school and also out of school, unless the bulb be completely enclosed in some sort of globe.

Fittings will differ with the usage of the room. For example, recently at the British Medical Association House I tried out a number of new fittings for new committee rooms and typists' rooms. Some of the modern pancake sort of opal shapes are extravagant in

design, in cost, and in current. These designs seem to aim at the enclosure of as much of the light as possible and to let very little out! In committee rooms the most successful fitment was one known as Holophane Reflector-refractor 14 inch. This has a prismatic dome of 14 inch spread with an incurved gallery below of the same glass with a 6 inch opening or mouth. With a 150 watt pearl lamp the whole forms a pleasant glowing mass which lights up the walls and faces to three to four foot-candles; and the light projected downwards on to the papers and tables measures 12 foot-candles. The lamp is six feet above the table top. Such a light is just what presbyopic committee men appreciate! The bulb is completely hidden, unless you put your head right under the globe.

But this fitting was not appreciated by the typists. They much preferred a simpler and an individual fitting. Each had a pendant bulb enclosed in a bell-shaped glass shade, opal within and green without, 9 inches by 9 inches, suspended 3 feet over the typewriter. There were as many pendants as typists. The big room was suffused with a soft light of greenish hue in contrast to the clear light on the machines. With a 60 watt pearl lamp the light on the keyboard of the machines measures 10 foot-candles.

Indirect or semi-indirect lighting is popular for showrooms and places of social intercourse. It causes much wastage of light; and the bowls are traps for dirt. Where work has to be done there is, in my experience, nothing to equal direct lighting.

The position of points of light in a classroom is of much importance. This is still left too much in the hands of the fitter, so that what he deems proper symmetry is adopted. In my view symmetry is wrong. The placing of points should be as asymmetrical as the windows. I urged this in 1906 and I still urge it. The light points should be sited from the window side of the room so that the children in their desks get their main light from their left-hand side. In a classroom with 20 dual desks of five rows of four each the points would be over the center of the first dual desk on the left hand of the front row, over the third dual desk from the left; and also over the third and fifth rows, making six points to the desks. The teacher should have a standard fitting on the desk with a bell-shaped opaque shade. The blackboard should have a completely screened bracket light.

Our measure of desirable light has changed amazingly in recent years. In the first decade of the century we were fully content with three foot-candles on desks and one foot-candle elsewhere. Now the minimum demands are corridors three, halls seven, notice boards seven, studies 10, gymnasiums 12, blackboards 15, and desks for fine work 15. This superior illumination costs little more than the old poorer light. The whole atmosphere of the school is vastly more cheerful, and so to the advantage of the children.

Associated Matters

There are some other matters worth commenting upon.

Daylight Lamps.—Daylight lamps are quite unnecessary. They waste 60 to 70 per cent of the light. Their sole value is for use where matching of colors must be done at night.

Blackboards—Blackboards of many sorts have been tried. I know of none better than those made of black or blue-black linoleum, suitably framed. This stuff is most pleasant to write or draw upon. Replacement is cheap. It rarely shines; any risk of this can be prevented by canting the board forwards at the top a couple of inches.

Cinema and Lantern Shows.—We are not concerned with the educational values of these demonstrations, only with the lighting effects. Yet I cannot help noting that I prefer the voice of the teacher to a "talkie." I think also the mental impression of a lantern slide, well demonstrated, is more lasting than that of a moving picture. Also that a good diagram or wall picture is better than either of the lantern shows. All lantern shows are trying to young and to sensitive eyes, so that rules are needed. In 1917 I suggested, in what was I think the first paper on the subject, some rules which I think still hold good:

1. There should be reasonable illumination of all parts of the hall not directly beside the screen.
2. Flickering and damaged films should be scrapped.
3. The rate of motion should be as nearly natural as possible.
4. There should be intervals between the shows, with exhibitions other than that of the optical lantern.
5. Shows should be limited to one hour once a week.
6. The seating in relation to the position of the screen should be satisfactory.

Later a committee was appointed by the London Illuminating Engineering Society (at the request of the London County Council) which dealt with the wider question of cinematography display for all sections of the population.

Playgrounds.—The use of these after school hours in the winter demands good lighting. There should be as much flood lighting as possible, and few, if any, deep shadows. Rule iv of the Home Office Report on the Lighting in Factories might well be applied to playgrounds. Altered to apply to playgrounds it would read thus: "Where any source of light is less than 16 feet height above ground level, no part of the source of fitting having a greater brightness than 10 candles per square inch shall be visible to any person while normally within 100 feet of the source, unless the angle of elevation from the eye to the source exceeds 20 degrees."

School and Home.—Finally, we shall all be in agreement that there has been in recent years an immense improvement in our ideas of what natural and artificial lighting for schools should be, even if our practice be not always up to the standard. But a very little investigation into the homes of the children will show that in these there is a wide field for improvement both in ideas and practice. Windows are still cluttered up with draperies. New lamps are put into old fittings without regard to screening. Shop windows in the lesser streets are a painful blaze of naked filaments. The cheaper children's papers are badly printed and on worse paper. So that it may be said that whereas the risks of injury to the children's eyes at school are diminished, the risks of the longer hours at home have increased. There is therefore ample scope for the missionary enterprise of the school doctor to spread from the school into the homes of the people both by precept and example.

The Head and Eye Protection Code of the National Bureau of Standards*

M. G. Lloyd

THE author presents the history, the extent of application, and the effect of the application of the head and eye protection code

THE American Standard Safety Code for the Protection of Heads, Eyes, and Respiratory Organs was issued by the National Bureau of Standards on November 1, 1938, and in December received the approval of the Standards Council of the American Standards Association. It is the third edition of the Code, which formerly covered only protection to the heads and eyes of industrial workers.

Origin of the Code

This Code originated in the work of federal safety engineers during the World War in formulating standards for the protection of the workers in federal establishments. Following the war it was put in the form of a national code, and when the American Standards Association extended the scope of its work to include safety standards, this Code was one of the projects in the first list which received its attention. The National Bureau of Standards has acted as sponsor and publisher of the three editions of this Code and has been assisted in its revision by a sectional committee of 40 members, representing the various interests which are concerned with its particular field.

The extension of the scope of this Code to cover protection to the lungs has increased the coverage and the bulk of the Code, but it

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is still a comparatively small document of 43 pages. A discussion of the rules, which is issued under the same cover, more than doubles the total length of the published handbook.

The subject of eye protection is covered in the new edition of the Code in substantially the same manner as in the previous edition which has been the standard on this subject for over fifteen years. The operations and processes for which protection is considered necessary are classified in nine groups according to the type of protection which is called for.

Eyes need protection from the impact of flying particles, from dusts, from chemical fumes, from hot splashing metals, and from injurious radiation.

Flying Particles

For protection against impact, both lenses and frames must be strong enough to resist shock and withstand hard usage. Processes which involve this hazard include chipping, caulking, and some riveting operations. Side shields are usually desirable; or the eye-cup type of goggle may be employed. Where the particles are small and in the nature of dust, such as in grinding work, strength of construction is not important and a lighter type of goggle may be used, although the chippers' goggle is entirely suitable for this purpose also. Where the dust is such as exists in the atmosphere, the same remarks apply and almost any type of goggle will accomplish the purpose. An example of this group is automobile driving without protection of a wind-shield.

Splashing Metal or Chemicals

The hazard of splashing metal is exemplified in such operations as babbitting and casting hot metal. In this work the goggle lens must be able to resist the heat of metal which may be splashing against it, but strength in the frames is not required. In the case of splashing chemical liquids or fumes, the goggle frames should make a tight contact with the face and the goggles used for this work should not have any ventilating openings such as are generally desirable in goggles for other purposes in order to further the comfort of the wearer and to prevent the fogging of the lens.

Abrasive Blasting

Abrasive blasting represents an occupation where not only the eye but the face must be protected from the impact of flying particles, and where the lungs must also be protected from the inhalation of dust. Goggles alone, consequently, are not sufficient for the purpose and a helmet or hood which covers the entire head is needed for such work.

Injurious Radiant Energy

The remaining three groups which have to do with eye protection are those which involve injurious radiant energy. If such radiant energy involves little or no ultraviolet light but merely high intensity of visible light, almost any goggle lens which cuts down intensity of the light will answer the purpose. The spectral transmission in this case is of little importance. If, on the other hand, injurious ultraviolet light is encountered, as in gas and electric welding, it is not sufficient to reduce visible light to a comfortable value, but care must be taken to cut off also the ultraviolet rays which are invisible but which are capable of causing serious injury.

Standardization of Shade Numbers.—The ability of goggle lenses and helmet windows to absorb light is usually indicated by the assignment of a shade number to the particular glass in question. Not so many years ago, each manufacturer of absorptive glass assigned his own shade numbers to his product and there was no assurance that a given shade number as obtained from one source would be the same in its properties as a glass from some other source carrying the same shade number. It is only within the past decade that the use of shade numbers has been standardized, and the new edition contains a table of properties which define the scale of shade numbers. This is the result of work which was carried out by the National Bureau of Standards and first utilized in the federal purchase specifications for goggles and welding helmets.

According to this scheme of standardization, the shade number has a definite relation to the density and also to the optical transmission of the glass. The density and shade number are connected by the formula, density = 3/7 (shade number minus one). The density is also connected to the optical transmission by being defined as "the logarithm to the base 10 of the reciprocal of the

transmission." Thus a glass of shade No. 8 has a density equal to 3, and as 3 is the logarithm of 1,000, the optical transmission of glass of shade No. 8 is .001, or one-tenth of one per cent.

The choice of a proper shade number for welding, or similar work, is partly a matter of personal choice, since some eyes are more sensitive to light than others. In general, the high shade numbers, such as 10, 12, and 14, are suitable for arc welding and cutting of different intensities, whereas shade Nos. 5, 6, and 8 are more suitable for gas cutting and welding. Shade Nos. 3 and 4 are not sufficiently dense for welding work but are suitable for cutting down the glare in furnace work, metal pouring, and outdoor work where sunlight may be reflected from the snow, from white sand, or from water. In all these cases, however, it is important that the ultraviolet light which is always present in sunlight, and present in larger quantities in radiations from intense electric arcs, should be held down to a very low value.

Corrective Lenses

The problem of giving proper protection to the eyes of workmen who must wear corrective spectacles has at times been a troublesome one. In the early days the best solution appeared to be to grind the lenses of protective goggles so as to give proper eye correction. With the development of goggle frames which can be worn over the corrective spectacles, we have an easy method for taking care of this situation, and in recent years there have also appeared on the market goggle frames which incorporate corrective lenses mounted inside of the protective lenses. This problem should, consequently, give no further trouble.

Proper Fitting and Sterilization of Goggles

To prevent accidents to the eye, it is not only necessary to have suitable goggles available, but it is necessary that they can be worn with reasonable comfort, or, experience indicates, they will not be worn when needed. The fitting of goggles to the individual wearer is consequently a matter of great importance. An occasional inspection to see that the fit is maintained and that lenses of goggles which have suffered damage are replaced, is a prime requisite in the fulfilment of eye protection. The Code consequently contains a

section of operating rules dealing with the proper fitting of protectors, the replacement of defective protectors, and the sterilization of goggles and other protectors after they have been worn by one worker before they are assigned to another. Various methods of sterilization are recognized, some of which are more appropriate for a particular type of protector, and some for another.

A final section in the Code deals with the necessary tests to insure that goggles and other protectors are suitable for their purposes. These tests involve mechanical strength of both lenses and frames in the case of chippers' goggles; a test for corrosion to see that frames will remain suitable for wear; optical tests for lenses and helmet windows which are to be used for welding and similar work; and various tests for equipment intended for protection of the head and lungs.

Safety Code's Uses

It should be recognized that the Safety Code aims to give the essential qualities of protective devices which are necessary to protect the wearer from the various hazards which have been considered, but the Code is not a complete purchase specification and does not cover anything but the minimum essentials for a protective device. Other considerations enter into the choice of a device for purchase and individual use, but in making purchases the customer should always insist at least on compliance with the American Standard Code. For those who desire further guidance in making purchases, reference may be made to a series of federal specifications which have been prepared for the purchase of goggles and helmets by the federal Government for the use of its own employees. These specifications can be obtained from the Superintendent of Documents in Washington, D. C., and will only be mentioned here.

GGG-G-501:	Goggles; eyecup, chippers'.
GGG-G-511:	Goggles; protective (glare and welders').
GGG-G-521:	Goggles; rubber-frame.
GGG-H-171:	Helmets; babbitting.
GGG-H-201:	Helmets and masks; for abrasive-cleaning.
GGG-H-211:	Helmets and shields for welding.

While the Code offers a recognized standard for adoption by regulatory authorities where mandatory rules are deemed desirable, the greatest use of the Code will no doubt be found to be by manufacturers and users of protective equipment. By meeting Code requirements the manufacturer may be confident that his product will meet the needs of industry.

It is the user of protective equipment, however, who usually approaches the problem with less specialized knowledge of conditions and who is consequently in need of such guidance as can be found in the Code. His first problem is to decide whether protective equipment is needed. If the operation in question is one which typically calls for protective equipment, the Code will make this clear.

After the need for a protective device has been settled, the Code will give the necessary guidance as to the type of device which should be obtained, and then purchases should be restricted to firms which guarantee their products to comply with Code requirements. If further proof of such compliance is desired, or in any purchases involving large quantities, representative samples of the equipment delivered may be tested by the purchaser if he has the necessary testing facilities, or by a qualified testing laboratory if those facilities are not at hand. Some of the tests specified in the Code can be carried out with very simple equipment, such as the drop test for strength of goggle lenses. Other tests call for special equipment and trained personnel, such as those for the ultraviolet transmission of welders' glasses.

Frequency of Eye Accidents

Nearly all of the eye accidents reported are of a mechanical nature, and the number indicates that existing hazards to the eye are frequently not realized by shop managers. A national survey made by the National Society for the Prevention of Blindness a decade ago showed that about 200,000 eye accidents were occurring in industry each year, and that except for fatal accidents they surpassed all others in seriousness and expense.

In New York State, in 1935, 1,618 compensable eye accidents were reported. Two of these resulted in death and nine in total disability. There were 435 cases of permanent partial disability,

usually represented by the loss of sight in one eye. The total amount of compensation was $927,625. In 1937 there were 1,979 compensable eye injuries, costing $1,121,000. I do not have figures for 1938 but in most years the compensation cost has exceeded a million dollars. Prevention continues to be a serious problem.

In plants which have supplied goggles systematically to their workers, thousands of employees have had their eyes saved. In one group of such plants one employee out of each 156 had an eye saved each year, but too frequently the hazards go without attention until after an accident occurs.

Compensation for the results of harmful radiation does not loom so large, because goggles or helmets are almost invariably used in welding and similar work; and even when the eye is injured, the effect is not realized until later, and the injury is usually only temporary, although cases of blindness from this cause have been reported. The great problem in eye protection is to get the worker to wear the protective device. As this phase of the problem is to be covered by another of your speakers, I shall not attempt to deal with it.

Fifteen Years' Progress in Eyesight Conservation in Industry*

Louis Resnick

"THERE is certainly no need for the blinding of any worker in American industry," says the author, after years of observation of industrial conditions. Advances, remaining problems, cost of industrial accidents, and recommendations are discussed in this brief article

Advances

First among the many respects in which progress has been made in eyesight conservation in industry during the past 15 years I would place the fact that there are in the industries of America today far fewer amateur shop oculists—the kind who use toothpicks, matches, pocket knives, files, screwdrivers, and other infection-bearing instruments in their efforts to remove particles from the eyes of injured fellow workers. I cite this bit of progress first because of the tremendous damage done to eyes of industrial workers, in the past, by crude and bungling first-aid.

There are fewer of these amateur shop oculists because of the greater appreciation by workmen and by management of the importance of avoiding infection in even the most minor eye injury and because there are now far more first-aid rooms with doctors or nurses in charge in industrial properties than was true 15 years ago. Whereas 15 years ago the full-time industrial physicians of the country might almost have been counted on the fingers of one man's hands, today the American Medical Directory records 345 doctors who are limiting their work to industrial medicine, and a thousand others who report industrial practice as their special interest.

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That there is still far to go in this respect is indicated by the fact —brought out at the First Annual Congress on Industrial Health recently held in Chicago—that the bulk of medical service to men and women injured in industry is rendered by general practitioners, many of whom, of course, have little knowledge of conditions in industry which lead to the injuries or industrial diseases they are called on to treat. This lack of information about the industrial conditions often handicaps the doctor in diagnosing or treating an industrial patient and certainly limits his ability to tell the patient or his employer how best to protect the worker's health on his return to employment. There is great need for bringing to general practitioners of medicine throughout the country, and particularly in industrial areas, more information about the accident and health hazards of industry. This, the National Society for the Prevention of Blindness proposes to do with respect to the accident and disease hazards affecting the eyes.

Great progress has been made in the past 15 years in the elimination of accident and disease hazards affecting the eyes through ventilation, exhaust systems, and air conditioning. Greater use of exhaust systems to draw off poisonous gases and dangerous dusts has saved thousands of workmen from daily exposure to working conditions which eventually, and often suddenly, result in seriously impaired vision, if not total blindness. Incidentally, ventilation, air-conditioning and exhaust systems installed for this purpose more than pay for themselves through the increased efficiency of the workers they protect, to say nothing of lowered workmen's compensation costs.

Industrial Lighting.—Great progress has been made in the past 15 years in industrial lighting which, like ventilation, has both increased the efficiency of employees and conserved their sight. While it is true we cannot point to particular individuals who have become blind through working under poor lighting conditions, we have evidence, developed in recent years, of the direct relation between bad lighting and bad eyesight. I refer to a study made by the United States Public Health Service of the relation of good lighting to occupational efficiency as demonstrated in two New York City Post Offices—one modern and well illuminated, the other old and with inadequate lighting.

The 2,400 employees studied in these post offices were comparable in their age distribution, in years of service in the post offices, and in the nature of their work. The prevalence of defects and diseases of the eye was found to be much greater in the poorly illuminated post office than in the well lighted post office.

The percentage of employees with normal vision in both eyes and with no defects was twice as great in the well lighted post office as in the poorly lighted office. In the well lighted office, 32 per cent of the workers were found to have defective vision in both eyes as against 42 per cent of the workers in the poorly lighted office. In the well lighted post office, 12 per cent were found to have inflammatory conditions of the eyes, and in the poorly lighted post office, 21 per cent had such conditions. In the well lighted post office, 22 per cent of the workers had muscular unbalance of the eyes, and in the badly lighted building, 33 per cent had muscular unbalance.

Most significant was the revelation that in the poorly lighted post office three times as many employees were subject to asthenopia—a weakness or rapid fatigue of the eyes often accompanied by pain and headache—as in the well illuminated post office. What was true in these two post offices is undoubtedly true throughout industry.

Ophthalmology and Industry.—In the field of ophthalmology great strides have been made in the treatment of eye injuries and diseases. I shall not attempt to describe this progress except for one of its most spectacular aspects.

Some of you may recall that the edition of *Eye Hazards in Industrial Occupations* which appeared fifteen years ago opened with the statement: "No one has yet produced an artificial eye that can see; nor does anyone dare predict that the day will ever come when it will be possible to replace the human eye with an artificial eye that will see." This is still true, but something almost as miraculous as an artificial eye that can see has happened during the intervening 15 years. That something has been mistakenly referred to in newspaper and magazine articles as "the transplanting of human eyes." Successful transplantation of a whole eye has never been accomplished. What actually has happened has been the transplanting of small segments of eye tissue—an operation

which has restored considerable sight to some who had little vision left and has saved others from impending blindness. More than 100 such operations have been performed in one New York hospital, many of them with good results.

Less spectacular but even more effective procedures for saving the eyes of workmen, after slivers of steel have pierced their eyes, have been developed in the past 15 years and treatment of industrial eye injuries of various sorts has been greatly improved in the past decade or two. I shall leave details of these to the medical profession.

Vision Testing in Industry.—The discovery and the correction of defective vision among employees also has seen great progress in American industry during the past 15 years. More plants have pre-employment examinations and follow-up eye examinations; the quality of eye examinations in industry has greatly improved. Plants which 15 years ago were content to have an employment clerk test vision by a chart and end the eye examination there, now recognize the desirability of having an ophthalmologist examine the eyes of every worker before he is put on the payroll and periodically thereafter.

Despite all the progress in this direction there is still the need of reminding management of industry that poor vision—whether due to insufficient light or to uncorrected eye defects—is one of the principal causes of fatigue, not only of the eyes but of the entire body. Employers and their supervisors and safety engineers should recall the words of Frank Gilbreth, one of the earliest students of fatigue in industry, who said, "No fatigue is more wearing than eye fatigue."

Safety Education in Industry.—Marked progress has been made in the education of workers and management as to the wearing of goggles. Fifteen years ago, few employers were willing even to ask such workers as carpenters or painters to wear goggles. Today, in at least one big company, The Pullman Company, where almost every trade and craft is represented, every employee, every foreman and superintendent, and every visitor is required to and does wear goggles all the time they are in the plant. I do not know of any other company with such a record of 100 per cent eye protection, but it is clear as I go through shops and factories this year that

there is far more widespread and more consistent wearing of goggles than ever before.

The progress that has been made in this direction is, however, still merely a beginning. There is no reason why every industrial property should not be able to do what The Pullman Company has done. If every industrial plant did require all employees and visitors to wear goggles and succeeded in getting the high percentage of observance The Pullman Company does for this rule, the bulk of the $10,000,000 paid as compensation for eye injuries in American industries each year would be saved; hundreds of workers would be saved from blindness each year; and thousands more would be saved from serious eye injuries which, while not producing blindness, leave them with vision in only one eye or with very limited vision in both eyes.

Factory Inspection.—Great progress has been made in training factory inspectors, both insurance and state government inspectors. Fifteen years ago it was a commonly voiced opinion that the average safety inspector, whether he worked for a state department or an insurance company, could have little influence with management except through his reporting of safety code violations, and even that part of his work was done by rote. Today, more and more safety inspectors are genuine experts in the detection and control or elimination of accident and health hazards in industry. The United States Department of Labor has assumed leadership in the training of state safety inspectors and the insurance companies have done much to make their inspectors safety engineers rather than mere field clerks or reporters. The importance of all this lies in the fact that in the last analysis the battle for safety is carried on by the safety inspector. He is on the firing line, and in the thousands upon thousands of plants too small or too backward to employ a safety engineer it is the safety inspector—whether he be a state inspector or an insurance inspector—who has the opportunity to put vitality into the safety program or to allow it to lapse into a mere paper program.

Some Remaining Problems

Now let's look at the other side of the scale. At this late date, after 25 years of safety campaigns, there is still to be found in some

plants the bad practice of hanging a pair of goggles on a nail beside the grinding wheel for the use of all men who may have occasion to work at the wheel. The tremendous progress that has been made in the design, manufacture, and promotion of goggles, and in education as to their use, is reflected in the fact that the lone pair of dust-accumulating goggles on a nail or in a cigar box over the emery wheel is a rapidly disappearing institution.

Eye Infections.—Almost as much can be said for the common towel, an even greater carrier of eye disease than the common pair of goggles. The roller towel was long ago legislated out of existence, and general sanitary conditions in most work places have been greatly improved. But there still are hundreds of thousands of industrial workers for whom no clean wash rooms, no clean towels, are available. So long as such conditions exist, workers are being exposed to a variety of contagious diseases, some of which may seriously affect their sight—and their employers' compensation costs.

There is another most important hazard to sight in which it is not clear—at least to me—whether we have made great progress or great backward strides in the past 15 years. I refer to the field of industrial poisons. Fifteen years ago, when the second edition of *Eye Hazards in Industrial Occupations* was published, it listed 22 industrial poisons, use of which presented hazards to the eyes. In the forthcoming third edition the list of industrial poisons involving hazards to the eyes has grown from 22 to 50. Both lists were taken from the best concise authority on the subject—a bulletin prepared by Louis I. Dublin and Robert J. Vane, published by the United States Department of Labor.

Industrial Poisons.—Whether this represents progress in greater recognition of the dangers involved in the handling of poisons which were used 15 years ago as well as today or the reverse of progress through the introduction of new poisons injurious to the eyes, is not clear; it probably represents both.

Of this we can be sure: the growing use of poisonous chemicals in industry now presents one of the most serious hazards to the eyes of workers. This hazard is aggravated by the fact that thousands of men and women who are working with these poisons are wholly unaware of that fact, wholly unaware of the disease hazards

to which they are exposed, and unaware of the steps they should take to guard against the harmful effects of these poisons. This is so because in many plants the poisonous chemical mixtures are trade secrets known to most of the persons who handle them only by some such symbol as Solution B3 or Solution C4, the precise make-up of the solution being known to perhaps only one or two persons in the plant.

As industry comes to be held responsible more and more for the effects of these poisons through their designation as compensable occupational disease hazards, the more progressive employers will use every known means to protect the workers exposed to these poisons. Meanwhile, it is the responsibility of every safety engineer, of every physician or surgeon having any industrial practice, and of every industrial nurse, to become familiar with all the poisonous substances used in their respective plants and to take all possible steps to protect the employees who are exposed to these poisons.

Cost of Industrial Eye Accidents

Despite all the progress already made—and it has been great progress—employers and employees of American industry are losing $50,000,000 a year as the result of preventable eye injuries, and the blind population of the country is being needlessly increased each year as a result of accidental injuries to the eyes. The loss to industry and its workers in New York State from this cause is in the neighborhood of $5,000,000 a year, of which approximately $1,000,000 represents compensation paid to workers for eye injuries and $4,000,000 represents indirect loss to industry and the loss in the worker's earning capacity.

In the last 10 years a total of more than 18,000 men and women in New York State have suffered permanent, partial, or total loss of vision as a result of occupational accidents or diseases, and employers in this State have during these 10 years paid more than $12,000,000 in compensation to these 18,000 blinded or partially blinded workers. The indirect loss to these injured workers and their employers was probably four times as great as the direct loss as measured in compensation paid.

Practically all this loss, and the human suffering resulting from

the blinding of industrial workers, could be averted by thoroughgoing co-operation of employer and employee in the utilization of demonstrated methods of preventing accidents and diseases. Not only would these losses be averted, but the efficiency and earnings of workers and employers would be substantially increased if both groups throughout industry did what is being done successfully in a few plants in America to prevent eye injuries.

Twenty years' observation of conditions in industry has convinced me that accidents are not inherent in industry, that they are almost 100 per cent preventable, and that the dividends on investments in accident prevention are sometimes greater than the dividends on the primary business of an industry. There is certainly no need for the blinding of any worker in American industry. The industrial accident and disease hazards affecting the eyes are now commonly known; methods of eliminating these hazards or of protecting workers against them have been thoroughly demonstrated; devices which provide protection against almost every type of eye accident are now available.

Some concerns have succeeded in reducing the frequency of eye injuries to the point where the blinding of a worker in their plants has become a rare instead of a commonplace occurrence. The accident prevention methods used by these corporations successfully have been widely reported by the National Society for the Prevention of Blindness, the National Safety Council, and by other interested organizations. In view of these facts and of the high cost of industrial accidents, it is a sheer waste of human and financial resources to continue exposing workers to industrial eye hazards.

Recommendations

Four things are necessary, however, before any industrial property can attain the goal of 100 per cent eye protection for its employees. They are:

1. A clear-cut and continuous demonstration by management that it is as much interested in accident prevention as in the manufacture and distribution of its particular commodities; without such a demonstration, management cannot hope to secure the complete co-operation of employee.

2. Thorough-going mechanical safeguarding of all hazardous operations, including provision of goggles, headmasks, and other eye protective devices, and *a mandatory rule requiring their use by every worker, supervisor, and visitor anywhere in the plant.*

3. A thorough-going, continuous program of safety education of workers and their supervisors.

4. Continuous and conscientious co-operation of employees with management in observance of safe practices.

Industrial Eye Protection Program: How Is It Set Up? How Is It Put Across? How Is It Kept Across?*

Harry Guilbert

THE safety man must be 100 per cent sold on the necessity for eye protection in order to carry out a thorough-going program. Mr. Guilbert presents the economic as well as the humanitarian arguments for making the use of goggles in a plant a mandatory rule of employment

How Is It Set Up?

Naturally the Safety Man must be 100 per cent sold on the necessity of eye protection. There is absolutely no use in trying to sell someone something that you yourself do not believe in. If anything needs sincerity, certainly it is a campaign to conserve vision in industry.

The next step is to "sell" management. The approach may be from one or all of the following angles:

Economic.—Comparing the cost of compensation for eye losses with the cost of goggles presents a convincing argument in favor of the latter. The Pullman Company's investment in sight protection has returned tremendous dividends, not only in cash but also in increased production and goodwill.

Increased Efficiency.—Goggles instill confidence in the wearer because he realizes that his eyes are safe. Hundreds of men have told me they would rather work without their shoes than without goggles because they fully realize the protection which goggles afford.

* Presented at the Tenth Annual Convention of the Greater New York Safety Council, March 27, 28, 29, 1939.

Humanitarian.—It has been well said that the eyes are the windows of the soul. Man's sight is his greatest asset. There is no substitute. Although a glass eye is an artistic piece of work, it is more ornamental than useful, and—as I said many years ago—you can't see through one.

One-eyed men are not generally being hired in industry today. Management must certainly assume some responsibility for the welfare of its men so that they will not become public charges.

When management has been sold on the value of an eye protection program, the next step is to conduct an intensive survey of the plant to ascertain just what the situation is and how you are to maintain your program. Have your industrial engineer accompany you. The survey should point out:

1. The type of goggle best suited for general use.

2. Types of goggles required for special jobs, such as welding, acid handling, dusty occupations, etc.

3. The number of prescription goggles needed. If you have not already done so, have the eyes of every employee tested; those wearing corrective glasses should be immediately equipped with goggles containing prescription lenses.

4. The cost. It might be well to give the management the estimated cost of the entire plan and arrange for a budget.

How Is It Put Across?

There is only one way to do this, namely, by means of a mandatory rule. There can be no exceptions whatever to that rule. At the entrance to each of our plants there is a sign, over the signature of the president of The Pullman Company, requiring everyone entering that plant to wear goggles. Occasionally some "wise guy" tries to gain admittance without complying, but the watchman never argues—he merely points to the sign.

The eye protection program can be put across by example, education, and the provision of comfortable goggles.

Example.—Every supervisor in the plant from the manager down must wear goggles every minute while he is in the plant. What type of foreman would ask a man to wear goggles while exposing himself to danger by not wearing them?

No leader worthy of the name would ask his men to perform some act that he is not willing to do himself. "Example is better than precept."

Education.—Explain to the worker the value of the human eye. For example, have him close one eye and then attempt to see his normal field of vision. Ask him to try to cross the street through traffic with only one eye open. Total loss of vision is easily demonstrated by having the man close both eyes and walk around a familiar room.

Provision of Comfortable Goggles.—Goggles must be comfortable and afford the maximum eye protection. It is important that every pair of goggles be properly fitted to the individual wearer. For obvious reasons this is just as mandatory as the rule pertaining to the wearing of goggles.

Every man with defective vision should be provided with goggles containing prescription lenses. Until his special goggles arrive, the worker should be furnished with cover-all goggles which can be worn over corrective glasses. Of course, the best goggle that money can buy should be distributed to each employee free of charge. The purchasing agent should have nothing whatever to do with this matter because the average one knows nothing about this complicated subject.

Don't forget to furnish a metal case with each pair of goggles. This is a splendid investment for obvious reasons.

A convenient repair service should be maintained in each plant. Daily check-ups should be conducted by supervisors and safety men in order to make certain that goggles are kept properly adjusted which is tremendously important.

How Is It Kept Across?

If the foregoing is strictly adhered to, an industrial eye protection program will take care of itself. Of course, firm supervision is vital. Compromise must not be tolerated. Occasionally, disciplinary action is necessary and in such a case, the individual concerned will be no loss to the company because anyone who would object to conserving his most precious possession would hardly be considered well balanced.

Display boards exhibiting goggles broken in service, together

with the name of the wearer and an outline of how the accident occurred, have proved beneficial. In maintaining the interest of the workers, suitable bulletins may be posted to good advantage. These and a host of other things are helpful, but there is no substitute for the mandatory rule. Until it is universally adopted in industry, thousands of eyes will be unnecessarily destroyed annually.

Some Random Thoughts

Who is immune to an eye accident? Of course, this is a foolish question to ask a group of intelligent people, but upon scores of occasions I have heard thoughtless, impractical people tell me where goggles should be worn in the plant and where they are not necessary. One of the reasons that eye protection has not made greater strides in industry is that many, many people who know very little, if anything, about the subject are stating very definitely what should be done about it.

Another reason why thousands of eyes are being destroyed in industry is that it requires a great deal of concentrated work and determined effort to bring any eye protection program to a successful issue. Most people sidestep hard work. Today in America there are hundreds of unfortunates getting along with one eye who would still have two eyes if the apathetic attitude of management and of some safety men had been dispelled years ago. Inertia—which is prevalent in the human race—has also played a material part in causing blindness, partial and total.

Personally, I have never had a workman tell me that he would not wear goggles, but managers, department heads, and foremen have told me that not under any circumstances would they be "annoyed" by them (as they put it).

This is practically a virgin field in industry today, and I should like to be turned loose in it with nothing else to do except sell workmen on the idea of eye protection.

Summary

1. Mandatory rule should be a condition of employment.
2. Great care should be exercised in distribution.
3. Intelligence should be used in selecting types.

4. Maintenance of goggles, consisting of adjustment, repairs, and sterilization, is important from an economic standpoint and is a service to which the men are entitled.
5. Tests to portray the strength of the lenses should be made before groups of men.
6. Complaints:
   a. Weight of goggles—There are 28.35 grams in an ounce, and 453.6 grams in a pound.
      Weight of a pair of corrective glasses—23.1 grams (which is less than an ounce).
      Weight of spectacle type goggles—50 grams.
      Weight of goggles with side screens—53.7 grams.
      Weight of cup type goggles—70.7 grams.
      A man's tie weighs 22 grams.
   b. Fogging—A small amount of Ivory soap rubbed on both sides of the lenses and polished with a dry cloth will remedy this.
   c. "They look funny." A one-eyed man looks funnier.
   d. "They hurt my eyes." Perhaps you should have an eye test.
   e. "They give me a headache." So does a new tarpaper kelly.
   f. "Side-screens obstruct my vision." Give a demonstration with a newspaper.

Modern Conception of Conservation of Vision*

Conrad Berens, M.D.

THE author presents a popular article on some common problems of eye hygiene from youth through old age

MAGIC and miracles, which in bygone days were said to restore sight, have been superseded by a new knowledge of the conservation of sight and by efforts to keep the eyes at their highest degree of efficiency. The layman, because he acquires from 80 to 90 per cent of his knowledge through his eyes, usually thinks of them in terms of what they bring him from the outside in knowledge, interest, or beauty. But for the eye physician the approach is reversed and he thinks in terms of what examination of the interior of the eye teaches him concerning the patient; for example, hereditary conditions, development, past illnesses, and present diseases. The physician no longer considers the eye an isolated organ but realizes that approximately 60 per cent of his patients show symptoms in their eyes which indicate trouble elsewhere in the body. By means of the ophthalmoscope the eye physician is able to examine the interior of the eye and thus often is the first to discover the evidence of serious diseases of the brain, the blood, the digestive tract, kidneys, heart, or arteries. This is an excellent reason for having the eyes examined periodically by an eye physician, that is, by one with the degree of M.D., who has had special training in diseases of the eyes.

General Considerations

Do you realize that efforts to prevent eye diseases and blindness should, and often do, begin before birth? Before parents consider

* Radio Address, WNYC, Thursday, December 22, 1938, under auspices of Radio Committee of the Medical Society of the County of New York.

having children, they should be certain that they have no hereditary transmissible disease. Congenital and hereditary defects are the cause of blindness in 51 per cent of the children in schools for the blind in the United States. The expectant mother, therefore, should be examined for evidence of syphilis or gonorrhea. If either of these diseases is present, she should receive treatment which may prevent infection of the baby's eyes. Since inflammation of the eyes of the newborn is a preventable disease, the proper care of the birth canal, the necessity of improving the treatment of gonorrhea in clinics, and the use of prophylactic stations should be stressed. Drops of silver nitrate used in the eyes of the newborn child also aid in the prevention of blindness. The National Society for the Prevention of Blindness and similar organizations have been active in disseminating information concerning prenatal and postnatal precautions. This has resulted in a diminution in the number of children blind from gonorrhea and syphilis.

Parents may protect the eyesight of the family by providing sanitary conditions and by educating their children in the prevention of eye infection from contaminated towels, dirty hands, and unclean objects. By prohibiting the use of toys with sharp points, and explosives, such as fireworks and firearms, as unsuitable playthings for children, parents can prevent many eye tragedies. In the schools and classes for the blind in the United States it was found that there are 500 children whose blindness is caused by accidents. Because it is estimated that this number is annually increased by 70, those who are responsible for the guidance of children should aid in the movement to prevent these unnecessary injuries.

The wise parent will also obtain reliable information regarding the influence of diet on eye health and eyesight, and will be on the alert for any eye inflammation or condition of vision which requires professional attention.

Crossed Eyes

If children show evidence of having crossed eyes, they should be examined to determine the cause—whether it is a disease of the eye, a need for glasses, a serious disease of the brain, or one of many other causes. Even though the eye is not diseased, if it is per-

mitted to turn in or out without training the sight, it may gradually become partially blind from lack of use.

Preschool Eye Examinations

The eyes of children should be examined a year or two before they enter school so that visual or muscular troubles may be found and corrected without interfering with school work. Poor vision and faulty co-ordination of the eyes may cause a child to be dilatory in his studies and emotionally upset.

Reading Difficulties

Much interest has been aroused in the past few years concerning so-called reading difficulties. It has been stated that reading difficulties are increasing because it has been estimated that 15 per cent of the children in our public schools are so handicapped. However, it is probably closer to the truth to think that more attention is being paid to the physically handicapped child. Therefore, because more thought is given to this subject, more reasons are being discovered for inability of the individual satisfactorily to perform the work of the average student.

There is no doubt that today, and especially in the past, many children were considered to be lacking in intelligence, when in reality they were suffering from some physical handicap or defect in training which prevented them from acquiring knowledge through reading.

As a matter of fact, many of the children who have so-called reading difficulties are above the average in intelligence when examined by accepted psychologic tests. Children with reading difficulties should be examined by an eye physician for defective vision and especially for anomalies which prevent the proper coordination of the eyes.

This examination should include a test for inequality of the size of images seen by the eyes and the eyes may be photographed on a moving film to give the ophthalmologist an idea of how the eyes move while reading. This is only part of the study which should be supplemented by a physical examination and by a psychologic examination.

Sight-Saving Classes

When children enter school, the effort to save eyesight is one of co-operation between the home and the school; it is a wise plan to perform a routine examination of the eyes of school children at least once a year. In this way, the early stages of any eye disease or beginning disturbance of sight may be discovered. If sight is seriously impaired, the remaining vision should be safeguarded by placing these children in sight conservation classes where they will use books and typewriters with large print and where illumination will be adequate. At present only 6,000 of the 50,000 children who need this service are receiving it. In many places there are no facilities for continuing the education of the partially-seeing in high schools and colleges, and the partially-sighted pupils of high school and college age either discontinue their studies or possibly continue them to the detriment of their vision.

A study of the causes of blindness in children showed that in many cases eyesight could be saved if the children had received thorough eye examinations and proper treatment. This investigation also revealed that many children classified as blind could be educated in classes for the partially seeing and sometimes in those for children with normal eyes.

Eye Injuries

Education of industrialists and workers has proved effective in promoting the compulsory use of goggles and other protective devices, thus reducing partial or total blindness resulting from industrial injuries. In order to appreciate the importance of such education everyone should see a group of patients partially or totally blinded through carelessness.

Focal Infection

The eyes may be diseased by the extension of inflammation from adjoining tissues, such as the nasal sinuses. The so-called focal infections, in which the poison center is found in a decayed tooth, in an abscess at the root of a tooth, in diseased tonsils, and probably even in the appendix, gall-bladder, or intestinal tract, may also be

associated with disease of the eye. The maintenance of good health thus seems to be a valuable safeguard for preserving eyesight.

Headache and Glasses

A word of caution concerning headaches and glasses is needed because too many people believe that headaches are caused primarily by eyestrain and that glasses will cure them. It is well known by physicians that the eyes are not the sole cause of headaches and that glasses will relieve only some of the eye headaches. Certain headaches, even though benefited by glasses, also require general medical treatment and eye exercises. The layman should remember that diseases of the sinuses and other conditions, for example, disorder of digestion, kidney disease, high blood pressure, brain lesions, and many other conditions, may produce headache which, of course, will not be cured by glasses.

Glasses do not change the structure of the eye: they assist the eyes to do the work they are unable to accomplish without glasses. The condition of the general health has a very important effect on the eyes.

Cataract

Environment may affect the eyes. For example, intense heat may cause the lens to become opaque, that is, a cataract may form. Inflammations are often associated with one form of cataract and the patient should be thoroughly examined in order to eliminate nasal disease and other focal infections. Many people fear cataract, but it is one of the least serious conditions which may cause loss of sight because if the cataract becomes sufficiently dense it may be removed by operation. Patients are usually informed that if a cataract is removed from one eye, the eyes will not function together; however, the eyes of some patients may be made to coordinate sufficiently with special glasses or eye exercises so that the discomfort caused by double vision is lessened. In spite of much advertising to the contrary there are no cures, other than surgical, which will clear away a well-developed cataract. But the progress of lens changes sometimes seems to be arrested by adequate care of the general health—for example, proper treatment of diabetes,

possibly diet containing proper vitamins, and also protection of the eyes from intense heat.

Glaucoma

When the tension or pressure within the eyeball is increased, glaucoma or hardening of the eyeball exists. Eyesight sometimes may be saved through continued eye and medical treatment. Treatment for glaucoma may consist in proper diet, sufficient sleep, exercise, elimination of waste products of the body, as by sweat baths, and by the continuous use of drugs in the form of eye drops. Surgical treatment is not always markedly successful. Much depends upon whether operation is performed early in the disease when advised by the eye surgeon. Disease in other parts of the body must be eliminated. Too frequently worry is also a factor in these cases of glaucoma.

Social Service and Follow-up Work

Social service and follow-up work in our clinics, and the co-operation of the physician and the social worker in treating patients, may prevent much unnecessary blindness. The social worker can investigate the patient's environment, for malnutrition and lack of cleanliness in the home may lay the foundation for many diseases of the eye. She can also see that the patient has sufficient illumination in the home. She can be instrumental in urging continuous treatment, when necessary, and through her personal contact with the patient and the community, can bring about an adjustment of the various problems which might be contributing to the eye condition.

Illumination

Under proper conditions a healthy eye in a healthy body is difficult to tire. What are the proper conditions? First, the vision should be corrected by glasses if they are required; and if eye muscular disorders are present, they should be treated by eye exercises or operation. The factor next in importance is adequate light, which varies according to the task to be accomplished. Avoidance of glare also aids vision and ocular comfort. Proper illumination is especially important if the eyes are defective or diseased.

It has been demonstrated that excessive use of the eyes, especially if they are defective, may cause spasm of the muscles of the stomach and even slow the beat of the heart. Therefore, it is wise to make fewer demands upon your eyes if you are overtired or ill and especially if your eyes are diseased.

Effect of Tobacco and Alcohol

Excessive use of tobacco, particularly in combination with the abuse of alcohol, often causes partial blindness. Inability to distinguish small colored objects, especially green and red objects, is one of the earliest symptoms of overuse of tobacco.

Conclusion

In conclusion, then, the sight may be saved by healthful, moderate living, early care of diseases of other organs, and by the elimination of focal infections. Prolonged use of the healthy eye after full development is apparently not injurious, provided vision is properly corrected by glasses, muscular troubles are treated, illumination is adequate, and general health is good.

Prevention of Blindness from Ophthalmia Neonatorum*

THIS report was prepared in co-operation with the National Society for the Prevention of Blindness through its consultative relationship with the Committee on Conservation of Vision of the State and Provincial Health Authorities of North America. It has brought up to date material previously published in D-63, "Prevention of Blindness in Newborn Babies," published in 1930

Sources of Information

Since this subject is of mutual interest to both organizations, your Committee on Conservation of Vision has once again availed itself of the facilities of the National Society for the Prevention of Blindness in assembling information for the preparation of this report.† Most of these data have been secured during the past four months from the executive health officer of each state and territory of the United States and each province of Canada, who were asked to supply the following:

	Number Supplying Data		
Item	*States*	*Territories*	*Provinces*
Schedule of information on official program for prevention of ophthalmia neonatorum	38 and D.C.	5	9
Excerpts from or copies of pertinent laws and regulations	39 and D.C.	2	7
Sample copy of birth certificate	47 and D.C.	5	9
Sample copy of individual case record form used in investigations by health authorities	13	2	0
Individual records for cases reported in 1937	15	2	4

* Reported by A. C. Jost, M.D., Chairman of the Standing Committee on Conservation of Vision of the State and Provincial Health Authorities of North America, at its 54th Annual Conference, Washington, D. C., April 20–26, 1939.

† For previous reports see Proceedings for 1926 and 1930.

Wherever it has been possible to do so, missing items have been supplied from the files of the National Society for the Prevention of Blindness. Moreover, the present program has been evaluated in the light of historical information already available in the offices of the Society.

History of Official Control Measures in the United States

About 1890, or ten years after Credé's now famous discovery of the efficacy of silver nitrate when used as a prophylactic to prevent ophthalmia neonatorum, New York State passed the first law relating to prevention of blindness from this cause. The law did not mention the use of a prophylactic, but required only that midwives, nurses and others *report* suspected cases to the health officer or to a legally qualified physician. Similar legislation or regulation followed in several other states (Maine, Rhode Island, Minnesota, Ohio, Maryland, New Jersey, Michigan, Missouri, Connecticut, Illinois, Pennsylvania, South Carolina, Iowa, Massachusetts, Idaho). The wording of the laws and regulations was not identical for all states. Most states required reporting of cases to either a health officer or a physician. Two states (Maine and Maryland) required reporting to physicians only. It is significant that the early legislation did not require reporting by physicians. Massachusetts was the first to require that physicians report their cases (1907). At the present time, it is the rule rather than the exception to require reporting by physicians, although the Maine law provides for reporting by non-medical attendants only and the report is made to a physician rather than a local health officer.

It was not until after the appointment of a special committee by the American Medical Association in 1906 and the organization in 1908 of the New York State Committee for the Prevention of Blindness* that public opinion was aroused to the support of mandatory legislation requiring the use of a prophylactic in the eyes of the newborn. Apparently the first state to do this was Wisconsin. A section covering this point, and also authorizing the health officer to provide proper medical care for cases if necessary, was incorporated into Wisconsin law in 1909.

* This State Committee later became the National Society for the Prevention of Blindness.

Once again the example was followed by state after state, so that by 1939 all but three states are requiring the use of a prophylactic for the prevention of ophthalmia neonatorum, although one-third of the states allow exceptions in certain groups of cases.

By 1914 a more inclusive type of legislation began to be introduced. Besides prescribing for reporting of cases and the use of a prophylactic, the law assigns specific duties to the local health officer and to the state health department. For example, the local health officer is usually required to investigate each case reported, he is sometimes given specific authorization to provide necessary medical care for cases and he is required to report to the state health department. The state health department in turn is required to provide for gratuitous distribution of a suitable prophylactic, to keep and publish records of cases of ophthalmia neonatorum and in general, by means of education, regulation, and legal process, to ensure the enforcement of the law.

The more recent laws have tended to include all of the desirable features, although several states do not specifically require investigation of all cases by health officers, several states make no provision for distribution of a prophylactic, and in comparatively few states are health officers empowered to provide medical care of cases other than that usually available for indigents.

More important than the specifications of the laws and regulations is the adequacy of their enforcement. Available information on the effectiveness of existing control measures in reducing the incidence of blindness from ophthalmia neonatorum is inadequate. Nevertheless, such information as exists has been incorporated into the summary of present control procedures.

Definition of Ophthalmia Neonatorum

Any analysis of reports and procedures in various health areas must take into consideration the variations in interpretation of what constitutes an ophthalmia neonatorum case. There are four types of definition in actual use. Not all of these variations are indicated in the wording of laws and regulations. In fact, there is no consistent relation between the terminology used and its interpretation in practice. Nevertheless, reports from health officers show that:

The term "ophthalmia neonatorum" is interpreted to include any indication of inflammation of the eyes of the newborn from whatever cause in:

10 states: Arkansas, Idaho, Illinois, Massachusetts, Minnesota, Mississippi, New York (exclusive of New York City), Oklahoma, Texas, Wisconsin.

3 provinces: Alberta, Prince Edward Island, Quebec.

The term "ophthalmia neonatorum" is interpreted to include eye infections of any type and chemical irritations in:

3 states: Connecticut, Ohio, Rhode Island (also New York City).

1 province: Saskatchewan.

The term "ophthalmia neonatorum" is interpreted to include only infections of the eyes in:

5 states: Alabama, Michigan, New Jersey, Vermont, Virginia.

The term "ophthalmia neonatorum" is interpreted to include only gonorrheal infection of the eyes in:

11 states: Arizona, Colorado, Delaware, Georgia, Kansas, Maine, Missouri, Montana, New Mexico, Tennessee, Washington.

2 territories: Canal Zone, Hawaii.

4 provinces: British Columbia, Manitoba, New Brunswick, Nova Scotia.

(19 states and District of Columbia, 4 territories, 1 province did not report on definition.)

The question naturally arises whether or not it might be desirable to work toward a single standardized definition. In considering the alternative definitions attention may focus on the elimination of all but the gonorrheal infections. This appears to be the present tendency, but it would not be desirable unless it can be proved that the gonorrheal cases are necessarily the only ones resulting in permanent defects of vision of any degree. Your committee had hoped to secure conclusive information on this point by analyzing case records. Unfortunately only 21 health areas were able to supply case records and, of these, 2 states sent only gonorrheal cases and 8 of the remaining health areas are interpreting the term ophthalmia neonatorum as including only gonorrheal cases. In spite of this fact the records received included a non-gonorrheal case which resulted in corneal scars. Moreover, it is not unlikely that children

enrolled in schools for blind with diagnosis of blindness due to ophthalmia neonatorum, but whose cases were never reported to health officers, may have lost their chances of adequate medical care because of discrimination against the non-gonorrheal case. It would seem unwise, at least for the present, to ignore any case which might be due to infection regardless of the organism.

In considering the possibility of infection occurring in the eyes of the newborn it is well to remember that, if silver nitrate is used under ideal conditions, only an occasional gonorrheal case may occur. However, infections of other types may be relatively frequent. Thygeson* found 6.6 per cent of hospital births had some inflammation of the eyes, the most important of which were staphylococcus aureus (hemolytic) 3.4. per cent, pneumococcus 0.9 per cent, inclusion blennorrhea virus 0.6 per cent, pneumococcus and staphylococcus 0.4 per cent, haemophilus influenzae 0.2 per cent.

All of the cases of non-gonorrheal infection recovered without defect after treatment suitable to the type of infection. Hence there is no evidence to indicate whether disastrous results might have occurred if treatment had not been given. The fact remains that almost all were of a type requiring treatment and at least one type (inclusion blennorrhea) involved care over an extended period.

Required Reporting of Ophthalmia Neonatorum Cases

As already mentioned, reporting of cases of ophthalmia neonatorum was the first definite control measure undertaken by health authorities. Latest information shows that:

Reporting of all cases to the health officer is required by *law* in:

25 states: Alabama, California, Connecticut, Delaware, Georgia, Idaho, Illinois, Kentucky, Louisiana, Massachusetts, Mississippi, Nevada, New Hampshire, New Mexico, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Rhode Island, South Dakota, Utah, Virginia, West Virginia.

District of Columbia:

1 territory: Philippine Islands.
2 provinces: Nova Scotia, Quebec.

Physicians are not required to report in:

5 states: Indiana, Iowa, Kansas, Maryland, New Jersey.

* Thygeson, Phillips, M.D.: "Ophthalmia Neonatorum—A Study of 261 Cases," *Transactions* of the American Ophthalmological Society, Vol. XXXIV, 1936, p. 340.

Neither physicians nor midwives are required to report in:
1 state: Wisconsin.

Reports are not required from hospitals or physicians in:
1 state: North Dakota.

Reporting of gonorrheal cases only is required in:
1 state: Colorado.

Reports are required from non-medical attendants only and are made to a physician rather than a health officer in:
1 state: Maine.

Reporting of all cases to the health officer is required by *health department regulation in:*

12 states: Arizona, Florida, Minnesota, Michigan, Missouri, Montana, Nebraska, South Carolina, Tennessee, Vermont, Washington, Wyoming.

1 territory: Puerto Rico.
6 provinces: Alberta, British Columbia, Manitoba, Ontario, Prince Edward Island, Saskatchewan.

Physicians are not required to report in:
2 states: Arkansas, Texas.

Only cases of gonorrhea are reportable in:
1 territory: Hawaii.
1 province: New Brunswick.

Reports are required of midwives only in:
1 territory: Canal Zone.

(Reporting is not required in Alaska and no information on this point is available for the Virgin Islands.)

Reporting laws and regulations are in force in most states, territories and provinces. They appear to be adequate for bringing to the attention of health authorities all infants who may be in need of skilled treatment to save vision in all but the 11 states, 2 territories and 1 province, which allow certain exceptions. However, existing legislation cannot be evaluated apart from its interpretations in practice and its enforcement. Your attention has been called to the tendency to restrict the scope of requirements by narrow interpretation. Tabulations of cases reported obviously

reflect this tendency and are affected also by incompleteness of reporting.

Number of Ophthalmia Neonatorum Cases Reported

Figures showing the number of cases reported by health area are shown for the nine-year period for which they are available. Case rates per 1,000 live births have been computed for the year 1937. The extreme variations do not give an accurate index of variations in incidence of ophthalmia neonatorum. They undoubtedly reflect differences in requirements and in the way these requirements are interpreted and enforced.

It should be noted that the figures for Massachusetts include eye infections among older age groups, and therefore its rate is not comparable to that in other states.

Some of the other high rates, as in Ohio, Connecticut, Maryland and New Jersey, may represent completeness in reporting rather than high incidence of ophthalmia neonatorum. On the other hand, in some instances health officers have stated that the very low rates cannot be assumed to picture actual conditions in their health areas. Moreover, during the period of compilation of the present report at least a few state health officers had the experience of turning up cases (some of them cases of blindness) which had never been included in the departments' official counts.

On the whole reporting appears to be quite incomplete. Whether further effort should be made to increase reporting in any health area would depend upon the actual conditions in that area. An occasional intensive check-up with hospitals, physicians, and midwives, as well as with commissions and schools for the blind, would seem advisable to improve reporting.

Investigation of Cases by Health Officer

Investigation of every case reported is routine in:

18 states: Alabama, Arkansas, Connecticut, Delaware, Florida, Illinois, Indiana, Maryland, Massachusetts, Minnesota, New Mexico, New York, Ohio, Oklahoma, Rhode Island, Tennessee, Utah, Virginia.

3 territories: Canal Zone, Puerto Rico, Virgin Islands.

5 provinces: Alberta, Manitoba, New Brunswick, Prince Edward Island, Quebec.

Cases are investigated only if the attending physician requests it in:

1 state: Maine.

Only cases attended by midwives are investigated in:

1 state: Georgia.

Cases are not investigated if the parents object in:

1 state: Illinois.

In the remaining health areas some follow-up may be done, but it is not reported that routine investigations are made of all cases, although in at least seven states (Colorado, Idaho, Louisiana, Mississippi, North Carolina, South Dakota, West Virginia) health officers have been authorized by law or regulation to do so.

All but Florida, Minnesota and Virginia report that investigations are made "immediately" after receipt of report.

Unless health officers are convinced that adequate medical care is already accessible and will be sought by parents and attendants for every infant needing care, it seems unwise to omit follow-up of cases. Potentially any case reported may have serious consequences. Without investigation it is impossible to determine which cases warrant special attention and how this is to be arranged.

Laboratory Reports

Laboratory reports indicating the organism responsible for the ophthalmia are secured in every case in:

12 states: Arkansas, Connecticut, Delaware, Maine, Massachusetts, Michigan, Montana, New Jersey, New Mexico, New York, Rhode Island, South Dakota.

District of Columbia:

4 territories: Canal Zone, Hawaii, Puerto Rico, Virgin Islands.
3 provinces: Alberta, Manitoba, New Brunswick.

The use of the laboratory to determine the presence or absence not only of the dread gonococci, but of any other infecting organism as well, is a guide to proper treatment which is too frequently neglected even when available.

Investigator's Records

Special case records are used to report cases investigated in:

7 states: Connecticut, Massachusetts, Michigan, New York (exclusive of New York City), Ohio, Rhode Island, Utah.
1 territory: Puerto Rico.

Either the venereal disease record form or the regular epidemiological reports are used by investigators in:

6 states: Delaware, Indiana, Kansas, Louisiana, Maine, Tennessee.
1 territory: Hawaii.

Although invaluable to the administrator in planning a control program, the use of a case record form appears to be the exception rather than the rule. Among the notable exceptions is the follow-up and record system of the New York State Department of Health. The plan was evolved with the cooperation of the Bureau of Services for the Blind of the New York State Department of Social Welfare, and unfortunately it is not in use in New York City.

The investigator's report includes a statement showing the ultimate outcome of each case, in terms of degree of permanent eye defect in:

8 states: Maryland, Massachusetts, Michigan, Mississippi, New York, Ohio, Rhode Island, Vermont.
1 territory: Hawaii.

Reports on the final outcome of each case after completion of treatment have not usually been required. However, the health officer should record this information as a check on the adequacy of service rendered. Moreover, he can and should take responsibility for seeing that the infant with an eye defect is referred for further corrective treatment, when this is possible, or for training as a handicapped child.

Facts Available From Case Records

The original plans for the present survey included a study of all cases reported in 1937. However, it soon became apparent that the information requested was not generally available.

Case records were received from:

15 states: Alabama, Arkansas, Connecticut, Delaware, Illinois,

Kansas, Maine, Maryland, Massachusetts, Michigan, New York, Ohio, Oregon, Rhode Island, Utah.

2 territories: Hawaii, Puerto Rico.

4 provinces: British Columbia, Manitoba, Nova Scotia, Saskatchewan.

Unfortunately the group of records received proved insufficient for conclusive analysis. The total group numbered only 276, or less than 10 per cent of the cases reported. Moreover, in several instances only selected cases, such as the gonorrheal cases, were forwarded. Because of the limitations of the group studied the following statements are offered not as facts but as items of interest:

1. In practically all cases the inflammation was noted before the fourteenth day after birth. Whether this offers proof of the adequacy of the usual time limit or merely indicates a tendency to ignore cases occurring after two weeks, it would be difficult to tell.

2. The proportion of cases reported to the health officer within 24 hours after symptoms are noted is disappointingly small. This is somewhat offset by the fact that nearly half of the cases are brought under medical care within that time. Nevertheless there appears to be need for reemphasis on the importance of speed both in reporting and in securing medical treatment.

3. The length of the period of medical care was reported as unknown in half the cases, and as four weeks or more in one-quarter of the cases. The cases having an unsatisfactory outcome apparently require a longer period of care on the average, but these were by no means the only cases. (In this connection it will be of interest to health officers to watch the results of experiments with the newer drugs which apparently promise to shorten the period of treatment.)

4. Among the cases studied 19, or approximately 7 per cent, resulted in some loss of vision, usually in both eyes. (Information is too indefinite in many cases to allow classification as blind or partially-seeing.)

5. Because of limitations of the data, it is not possible to state with any degree of assurance the factors which were responsible for loss of vision. However, there is evidence that the following influenced results:

a. Gonorrheal infections occurring despite use of a prophylactic.
b. Non-gonorrheal infections, despite use of a prophylactic.
c. Non-use of a prophylactic, or use of an inadequate drug.
d. Delay in securing medical treatment.
e. Prematurity or malnutrition of the infant.
f. Inadequate prenatal care, particularly failure to diagnose infection in the mother.

Distribution and Use of a Prophylactic

Because of the general reliance on the universal use of a prophylactic at birth as the most essential procedure in the control of ophthalmia neonatorum, it is of special interest to check on the amount of free prophylactic distributed and the extent to which birth certificates are used as a means of checking whether a prophylactic has been used.

The 1937 distribution of prophylactic was sufficient for all live births in:

7 states: Alabama, Illinois, Massachusetts, Michigan, New Mexico, Oklahoma, Rhode Island.
1 territory: Virgin Islands.
1 province: Ontario.

The distribution was at least sufficient for non-hospital births in several additional states, as indicated:

8 states: Connecticut, Minnesota, Mississippi, New York, North Carolina, Ohio, Virginia, Wisconsin.

The distribution was at least sufficient for births attended by midwives in several additional states, as indicated:

10 states: Colorado, Delaware, Florida, Missouri, Montana, New Hampshire, New Jersey, South Dakota, Tennessee, West Virginia.
(Since full data on the distribution of births were not available for all territories and provinces, no estimates of the adequacy of the supply of prophylactic distributed could be made.)

In view of the comparatively low cost of the ampules of silver nitrate it would be advisable to make them available at least for all non-hospital births to insure the use of this preventive. In health areas which are not already doing so, it might be advisable

to give consideration to the development of a plan for distributing to all recognized birth attendants a supply of silver nitrate sufficient for the number of births attended by each.

The birth certificates show that the attendant at birth is asked to state whether prophylaxis was used to prevent ophthalmia neonatorum in:

29 states: Arkansas, California, Delaware, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York (exclusive of New York City), Ohio, Oklahoma, Oregon, North Dakota, Rhode Island, Texas, Utah, Virginia, West Virginia, Wisconsin, Wyoming.

2 territories: Hawaii, Puerto Rico.

3 provinces: British Columbia, Nova Scotia, Prince Edward Island.

The state of South Carolina has recently passed a law requiring that information concerning the use of a prophylactic be added to the birth certificate.

Information on this point is not available for the Phillipine Islands. The health areas which do not include this item on the birth certificate are: 18 states (Alabama, Arizona, Colorado, Connecticut, Florida, Kentucky, Maine, Maryland, Massachusetts, Mississippi, Nevada, New Hampshire, North Carolina, Pennsylvania, South Dakota, Tennessee, Vermont, Washington), the District of Columbia, 3 territories (Alaska, Canal Zone, Virgin Islands), and 6 provinces (Alberta, Manitoba, New Brunswick, Ontario, Quebec, Saskatchewan).

The mere presence on the birth certificate of a question relating to prophylaxis undoubtedly has an educational value. However, it is highly desirable that the responses be checked at least periodically and that violations of the law be investigated.

Progress to Date

For over thirty years it has been the practice of the National Society for the Prevention of Blindness to collect annual data on the number of new pupils entering schools for the blind in the United States because of blindness due to ophthalmia neonatorum. Although this figure is not actually a check on current cases of blindness from ophthalmia neonatorum—because children enter

school six or seven years after the occurrence of blindness from ophthalmia neonatorum—in the absence of a better index we have used this figure year by year to check the success of the ophthalmia neonatorum control program.

The latest figure available shows that in 1937–38, 7.4 per cent of the new pupils entering schools for the blind were blind because of ophthalmia neonatorum. Compared with the rate for the school year 1906–07, which was 28.2 per cent, there has been a 74 per cent reduction. However, a glance at the rates for the past eight years shows that there has been little change. Thus there is some indication that the existing control measures, or more specifically the present practices in carrying out the control program, cannot be expected to produce much more reduction in the incidence of blindness from ophthalmia neonatorum. Apparently the figures on cases of ophthalmia neonatorum reported to the health department show about the same tendency. If this is true we must either accept the fact that some blindness from this cause is inevitable or we must do more than we are now doing to insure better results.

Summary

Historically the public health program for the prevention of blindness from ophthalmia neonatorum has shown several stages of development during the past fifty years. These are:

1. An effort to have all cases brought to the attention of a physician for treatment after the infection had occurred—*i. e.*, case reporting.
2. An insistence upon use of a prophylactic in the eyes of the newborn by the attendant at birth.
3. An acceptance by the local health officer of responsibility for follow-up of cases to insure proper treatment.
4. An authorization to the state health department to supply free prophylactics.
5. An authorization to supply free expert medical and nursing care on an emergency basis.

There has been a gradual increase in the number of health areas making the above provisions. However, at the present time they are by no means universal. Some areas lack legal authorization

for certain portions of the program, while many others show a tendency to become lax in enforcement.

The remarkable reduction in blindness from ophthalmia neonatorum is cause for rejoicing but it seems probable that we may not attain 100 per cent elimination of blindness from this cause without further intensive effort.

Recommendations

It is recommended that:

1. An effort be made to standardize definitions and routine control measures.
2. Areas now lacking in legal authorization for any essential parts of the control program be brought up to standard in these respects.
3. An effort be made to secure additional personnel and funds for the program wherever needed.
4. The health officer in each state, territory and province check the completeness of case reporting in his area and, where this is proved necessary, devise plans for better enforcement of the existing legislation on this point.
5. The amount of prophylactic distributed be increased to meet the needs more adequately.
6. Local health officers be advised to make complete and prompt investigation of all cases reported to insure adequate bacterial diagnosis and appropriate treatment.
7. Special provision be made for expert ophthalmological and nursing care whenever necessary. These services to be arranged without delay and available also for similar emergency cases occurring at a later age.
8. The end results of all cases be investigated and incorporated in case summaries forwarded to the executive officer of each health area.
9. The above mentioned case records and other sources of information be analyzed by your committee to determine whether further developments in the program are needed and if so, what.
10. Laboratory research organizations be encouraged to experiment in the development of safe and efficient drugs for prophylaxis and/or treatment of ophthalmia neonatorum.

Appendix

Summary of Laws and Regulations* Requiring Reporting of Ophthalmia Neonatorum Cases as of 1939

Health Area	*Reporting of Cases* *Required by*	*Year Initiated*†	*Limitations in Law or Regulation, if Any*
State			
Alabama	Law	1915	
Arizona	H.D. Reg.	1914	
Arkansas	H.D. Reg.	1913	Reporting by physicians not required
California‡	Law	1915	
Colorado	Law and H.D. Reg.	1916	Law makes cases not attended by physician reportable to physician only Regulations make reportable gonorrheal cases only
Connecticut	Law	1895	
Delaware‡	Law	1917	
Dist. of Columbia	Law	1911	
Florida‡	H.D. Reg.	1917	
Georgia	Law	1918	
Idaho	Law	1907	
Illinois	Law	1895	
Indiana	Law	1911	Reporting by physicians not required
Iowa‡	Law	1896	Reporting by physicians not required
Kansas	Law	1913	Reporting by physicians not required
Kentucky‡	Law	1914	
Louisiana‡	Law	1914	
Maine	Law	1891	Reporting by physicians not required Cases not attended by physicians, made reportable to physicians only
Maryland‡	Law	1894	Reporting by physicians not required
Massachusetts	Law	1902	
Michigan	Law and H.D. Reg.	1895	Law makes cases not attended by physician reportable to physician only Regulation makes ophthalmia neonatorum reportable as any communicable disease

H.D. Reg.—Health Department Regulation.

* Regulations of state health departments usually have the status of laws.

† Year given is first year in which some law or regulation was put into effect. The status of the legislation and the actual requirements may have undergone changes between the year stated and the present date.

‡ Information as of 1930.

Summary of Laws and Regulations*—*Continued*

Health Area	*Reporting of Cases* *Required By*	*Year Initiated*†	*Limitations in Law or Regulation, if Any*
State			
Minnesota	H.D. Reg.	1893	
Mississippi	Law	1916	
Missouri	H.D. Reg.	1895	
Montana	H.D. Reg.	1913	
Nebraska‡	H.D. Reg.	1915	
Nevada‡	Law	1921	
New Hampshire	Law	1911	
New Jersey	Law	1895	Reporting by physicians not required
New Mexico‡	Law	1919	
New York	Law	1890	
North Carolina‡	Law	1915	
North Dakota‡	Law	1911	Reporting by hospital and physicians not required
Ohio	Law	1894	
Oklahoma	Law	1921	
Oregon	Law	1915	
Pennsylvania‡	Law	1895	
Rhode Island	Law	1892	
South Carolina‡	H.D. Reg.	1896	
South Dakota	Law	1913	
Tennessee	H.D. Reg.	1911	
Texas	H.D. Reg.	1911	Reporting by physicians not required
Utah	Law	1911	
Vermont‡	H.D. Reg.	1910	
Virginia	Law	1918	
Washington‡	H.D. Reg.	1912	
West Virginia	Law	1916	
Wisconsin	Law	1909	Reporting by physician or midwife not required
Wyoming‡	H.D. Reg.	?	
Provinces			
Alberta‡	H.D. Reg.	?	
British Columbia‡	H.D. Reg.	?	
Manitoba‡	H.D. Reg.	?	
New Brunswick	H.D. Reg.	?	Gonorrheal cases reportable under venereal disease regulation
Nova Scotia	Law	?	
Ontario	H.D. Reg.	?	
P. E. I.	H.D. Reg.	?	
Quebec	Law	?	
Saskatchewan	H.D. Reg.	?	

H.D. Reg.—Health Department Regulation.

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‡ Information as of 1930.

Summary of Laws and Regulations*—*Continued*

Reporting of Cases

Health Area	*Required By*	*Year Initiated**	*Limitations in Law or Regulation, If Any*
Territories			
Alaska	Not Required	..	
Canal Zone	H.D. Reg.	?	Midwives only
Hawaii	H.D. Reg.	?	Gonorrheal cases only
P. I.‡	Law	1929	
P. R.‡	H.D. Reg.	1899	
Virgin Islands	N.R.	N.R.	

H.D. Reg.—Health Department Regulation.

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† Year given is first year in which some law or regulation was put into effect. The status of the legislation and the actual requirements may have undergone changes between the year stated and the present date.

‡ Information as of 1930.

Number of Ophthalmia Neonatorum Cases Reported

Health Area	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*	*1936*	*1937*	*No. Cases Per 1,000 Live Births*
Alabama	26	22	14	19	14	15	20	19	14	.23
Arizona	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	15	1.43
Arkansas	21	14	8	5	9	10	16	3	16	.45
California	23	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	31	.33
Colorado	2	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Connecticut	2	31	93	81	10	98	138	189	87	3.83
Delaware	1	1	2	4	1	0	2	1	7	1.61
Dist. of Col.	0	N.R.	N.R.	N.R.	N.R.	N.R.	5	4	9	.73
Florida	4	0	0	2	0	0	0	3	5	.17
Georgia	20	N.R.	N.R.	N.R.	1	2	0	3	4	.06
Idaho	1	0	0	0	0	0	1	0	1	.10
Illinois	561	323	95	77	82	53	66	53	44	.38
Indiana	N.R.	2	2	1	1	1	1	0	1	.02
Iowa	4	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Kansas	2	2	2	1	0	3	0	2	1	.03
Kentucky	12	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Louisiana	5	6	2	4	0	1	5	6	7	.15
Maine	2	2	3	10	5	1	2	1	2	.13
Maryland	19	90	87	89	90	77	63	66	65	2.33
Mass.[a]	1,399	1,289	1,249	1,138	1,018	1,072	1,076	1,116	1,069	17.40
Michigan	28	0	0	0	0	9	12	14	21	.23
Minnesota	0	6	6	6	7	7	8	1	6	.12
Mississippi	172	168	106	75	99	122	113	96	66	1.27
Missouri	24	42	20	11	6	10	6	12	5	.09
Montana	0	4	2	0	0	2	0	0	2	.19
Nebraska	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Nevada	0	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
New Hamp.	4	0	2	2	1	0	1	2	0	0
New Jersey	42	43	36	28	26	20	23	112	128	2.35
New Mexico	7	47	26	48	35	14	24	14	44	3.19

[a] Includes all types of infection and all ages.

Number of Ophthalmia Neonatorum Cases Reported—*Continued*

Health Area	*1929*	*1930*	*1931*	*1932*	*1933*	*1934*	*1935*	*1936*	*1937*	*No. Cases Per 1,000 Live Births*
N. Y. City..	N.R.	3	1	0	1	1	5	15	26	.25
N. Y. State..	63	60	47	58	42	67	69	99	97	1.16
No. Carolina.	12	14	12	18	9	14	19	22	17	.21
No. Dakota.	0	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Ohio........	1,156	1,268	947	989	1,069	886	999	878	773	7.20
Oklahoma...	16	8	12	6	9	6	7	12	12	.30
Oregon......	2	0	1	2	1	2	2	0	1	.06
Pennsylvania	151	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Rhode Island	N.R.	7	10	3	3	5	1	3	7	.68
So. Carolina.	164	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
So. Dakota..	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	1	0	N.R.
Tennessee...	38	28	35	30	37	36	25	38	40	.77
Texas.......	16	10	4	5	22	55	27	27	72	.62
Utah.......	0	0	0	0	0	0	1	0	2	.16
Vermont....	0	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Virginia.....	N.R.	11	16	24	11	9	14	12	22	.42
Washington.	2	0	1	2	1	4	2	0	0	0
West Va.....	6	10	7	11	5	8	0	3	9	.21
Wisconsin...	23	12	13	12	6	19	10	11	7	.13
Wyoming...	2	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Sub-total..	4,032	3,523	2,861	2,761	2,621	2,629	2,763	2,838	2,735	1.50
Provinces of Canada										
Alberta.....	N.R.	0	0	0	0	0	0	0	0	0
B. C........	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	1	1	2	.18
Manitoba...	0	2	0	1	1	0	0	0	3	.23
N. B........	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
N. S........	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	4	.35
P. E. I......	N.R.	2	1	1	2	0	0	0	0	0
Ontario.....	15	1	5	52	2	3	1	1	6	.10
Quebec.....	0	N.R.	N.R.	28	15	16	13	14	35	1.88
Sask........	7	0	0	1	1	1	1	0	1	.05
Sub-total..	22	5	6	83	21	20	16	16	51	
Territories										
Alaska......	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Canal Zone..	N.R.	7	14	4	9	3	5	10	15	?
Hawaii.....	4	0	0	0	0	0	0	1	4	.47
P. I.........	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
P. R........	1	N.R.	93	85	74	68	73	47	22	?
Virg. Is......	N.R.	2	1	0	0	4	0	2	0	0
Sub-total..	5	9	108	89	83	75	78	60	41	
Grand total.	4,059	3,537	2,975	2,933	2,725	2,724	2,857	2,914	2,827	1.40(?)

Summary of State Laws and Regulations* Requiring the Use of a Prophylactic for the Prevention of Ophthalmia Neonatorum as of 1939

Health Area	*Use of a Prophylactic Required By*	*Year† Initiated*	*Limitations in Law or Regulations, if Any*
State			
Alabama	Law	1919	
Arizona	..	..	
Arkansas	H.D. Reg.	1922	
California‡	H.D. Reg.	1925	Limited to births in hospitals and maternity homes
Colorado	Law	1937	Waived if parents object
Connecticut	Law	1935[a]	
Delaware	Law	1917	
Dist. of Col.	Law	1937	
Florida	H.D. Reg.	1918–22	Limited to births attended by midwives
Georgia	Law	1918	
Idaho	Law	1916[b]	
Illinois	Law	1933	
Indiana	Law	1911	Limited to cases in which possibility of infection is suspected
Iowa	Law	1921	Waived if parents object
Kansas	Law	1929	Waived if parents object
Kentucky‡	H.D. Reg.	1914	
Louisiana‡	H.D. Reg.	1914	
Maine	Law	1919	Waived if parents object
Maryland‡	Law	1924	Limited to births attended by midwives
Massachusetts	Law	1936	
Michigan	Law	1913	
Minnesota	H.D. Reg.	1916	Waived if parents object
Mississippi	Law	1916	Limited to births in hospitals and maternity homes and those attended by midwives
Missouri	Law	1921	
Montana	..	..	
Nebraska	Law	1915	
Nevada	Law	1921	
New Hampshire	Law	1919	
New Jersey‡	H.D. Reg.?	?	
New Mexico‡	H.D. Reg.	1922	Waived if parents object
New York	Law	1922	
North Carolina	Law	1917	

H. D. Reg.—Health Department Regulation.

* Regulations of state health departments usually have the status of laws.

† Year given is first year in which some law or regulation was put into effect. The status of the legislation and the actual requirements may have undergone changes between the year stated and the present date.

‡ Information as of 1930.

[a] Connecticut law in force 1921 to 1935 was limited to births in state-aided institutions and those attended by midwives.

[b] Idaho regulation in force 1913 to 1916.

Summary of State Laws and Regulations*—*Continued*

Health Area	*Use of a Prophylactic Required By*	*Year† Initiated*	*Limitations in Law or Regulations, if Any*
State			
North Dakota‡...	Law	1911	Limited to cases in which possibility of infection is suspected
Ohio............	Law	1913–15	Limited to births in hospitals and maternity homes and those attended by midwives
Oklahoma.......	Law	1921	Waived if parents or physicians object
Oregon..........	H.D. Reg.	1919	
Pennsylvania‡....	H.D. Reg.	1926	
Rhode Island....	Law	1914	
South Carolina[c]..	Law	1939	
South Dakota....	Law	1925	
Tennessee‡......	Law	1915	
Texas...........	Law	1921	
Utah[d]...........	..	..	
Vermont........	H.D. Reg.	1939	
Virginia.........	Law	1918	
Washington......	H.D. Reg.	1921	
West Virginia....	Law	1919	
Wisconsin.......	Law	1909	
Wyoming‡.......	Law	1921	Waived if parents object
Provinces			
Alberta.........	H.D. Reg.	?	
British Columbia‡	H.D. Reg.	?	
Manitoba.......	..	..	
New Brunswick..	H.D. Reg.	?	
Nova Scotia.....	H.D. Reg.	?	
Ontario.........	H.D. Reg.	?	Limited to births attended by physicians
P. E. I..........	H.D. Reg.	?	
Quebec.........	..	..	
Saskatchewan....	H.D. Reg.	?	Limited to births attended by physicians
Territories			
Alaska‡.........	H.D. Reg.	?	
Canal Zone......	H.D. Reg.	?	Limited to births attended by midwives
Hawaii..........	H.D. Reg.	?	
Philippine Islands	..	..	
Puerto Rico.....	H.D. Reg.	?	
Virgin Islands....	N.R.	..	

H.D. Reg.—Health Department Regulation.

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‡ Information as of 1930.

[c] South Carolina regulation in force for midwives only since 1919.

[d] Use of a prophylactic is recommended in health department regulation of Utah.

Distribution of Prophylactic

Health Area	Type and Strength	Free	Hosp.	Phys.	Mid-wife	Container	Amount Distributed Sufficient for: No. of Births	Amount Distributed Sufficient for: % of Total Births
State								
Alabama..	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Beeswax cap.	64,204 [i]	100+
Arizona...	None	..	..	..	..	..	..	0
Arkansas..	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	2,450 [c]	14
California.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Colorado..	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	7,000 [j]	36
Conn......	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Paraffin	20,325 [i]	89
Delaware..	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	1,500 [j]	34
D. C.......	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	[g]	..
Florida....	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	17,433 [j]	59
Georgia...	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	39,203 [b]	31
Idaho......	None	..	..	..	..	..	..	0
Illinois....	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	141,424 [i]	100+
Indiana...	None	No	..	..	No	None	None	0
Iowa......	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Kansas....	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	N.R.	N.R.
Kentucky.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Louisiana..	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Maine....	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	1,008	7
Maryland.	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	N.R.	N.R.
Mass......	$AgNO_3$ 1%	Yes	Yes	Yes	[a]	Wax amp.	76,340[i]	100+
Michigan..	$AgNO_3$ 1.5%	Yes	Yes	Yes	Yes	Wax amp.	117,012[d,i]	100+
Minnesota	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	37,020[i]	77
Mississippi	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Beeswax	44,425[i]	85
Missouri...	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	4,690[j]	8
Montana..	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	5,236[b,j]	26
Nebraska..	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Nevada...	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
N. H......	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	1,000[j]	13
New Jersey	$AgNO_3$ 1%	Yes	No	No	Yes	Wax amp.	3,300[j]	6
N. M......	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	24,000[i]	100+
N. Y. S....	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	55,259[i]	66
N. Y. C....	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Beeswax	3,000	3
N. C.......	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	66,500[i]	84
N. D.......	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Ohio......	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	123,000[b,i]	57

[a] Midwives not recognized.
[b] Ampules.
[c] Not distributed free until July 1, 1937.
[d] Year ending June 30, 1938.
[g] Not distributed until 1938.
[i] Quantity distributed sufficient for non-hospital births.
[j] Quantity distributed sufficient for births attended by midwives.

Distribution of Prophylactic—*Continued*

Health Area	*Type and Strength*	*Free*	*Hosp.*	*Phys.*	*Mid-wife*	*Container*	*Amount Distributed Sufficient for* — *No. of Births*	*Amount Distributed Sufficient for* — *% of Total Births*
State								
Oklahoma	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Capsule	50,000[i]	100+
Oregon	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Penna	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
R. I.	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	[f,i]	100
S. C.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
S. D.	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	3,168[j]	27
Tennessee	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	32,508[j]	63
Texas	$AgNO_3$ 1%	Yes	No	No	Yes	Wax-Par. amp.	13,198	11
Utah	None	No	No	No	No	None	N.R.	N.R.
Vermont	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Virginia	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	50,000[i]	97
Wash.	None	No	No	No	No	None	N.R.	0
W. Va.	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax tube	10,820[e,j]	26
Wisconsin	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax-Par. amp.	100,000[b,i]	93
Wyoming	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
Provinces of Canada								
Alberta	None	..	..	..	..	..	None	0
Brit. Col.	$AgNO_3$ 1%	Yes	No	Yes	Yes[h]	Wax amp.	1,144	10
Manitoba	$AgNO_3$ 1%	Yes	Yes	Yes	None	N.R.	2,071	16
N. B.	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax amp.	650	6
N. S.	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Wax cap.	5,000	43
Ontario	$AgNO_3$ 1%	Yes	Yes	Yes	N.R.	Vial with dropper	71,405	100+
P. E. I.	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Amp.	2,000	96
Quebec	$AgNO_3$ 1%	Yes	Yes	Yes	[a]	Wax amp.	78,768[b]	52
Sask.	$AgNO_3$ 1%	Yes	Yes	Yes	[a]	Wax cap.	9,000[b]	24
Territories								
Alaska	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Amp.	1,000	?
Canal Zone	$AgNO_3$ 1% Argyrol 25%	Yes	Yes	Yes	Yes	Bottle	4,529	?
Hawaii	$AgNO_3$ 1%	Yes	No	No	Yes[a]	Wax amp.	N.R.	..
P. I.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.	N.R.
P. R.	$AgNO_3$ 1%	Yes	No	No	Yes	Wax amp.	24,000	?
Virgin Is.	$AgNO_3$ 1%	Yes	Yes	Yes	Yes	Bottle	All	100

[a] Midwives not recognized.
[b] Ampules.
[e] Fiscal year—1936–37.
[f] Quantity sufficient for all births.
[h] Distributed free to Victorian Order of Nurses and Public Health Nurses.
[i] Quantity distributed sufficient for non-hospital births.
[j] Quantity distributed sufficient for births attended by midwives.

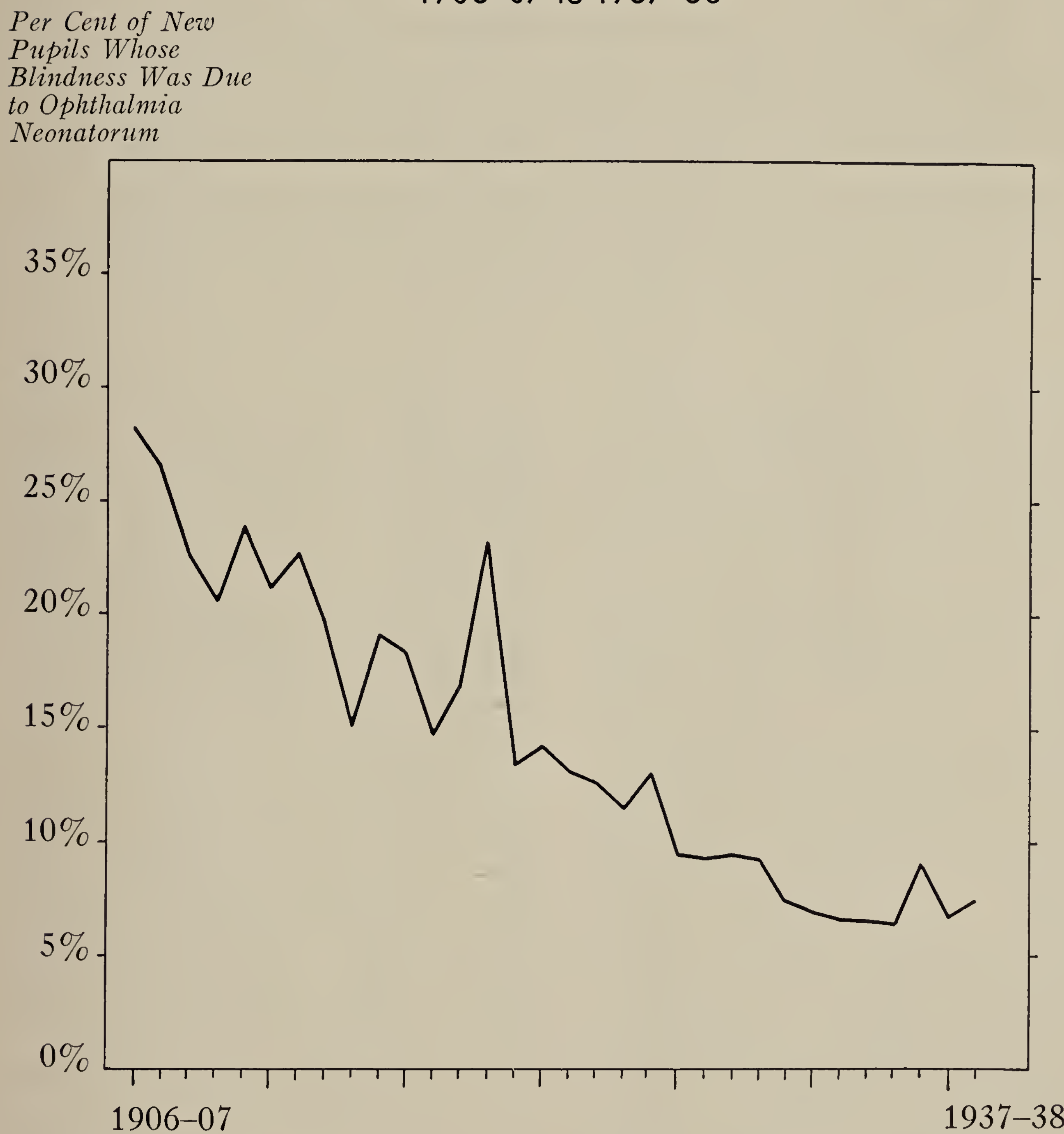
Per Cent of New Admissions to Schools and Classes for the Blind Whose Blindness was Due to Ophthalmia Neonatorum, Shown by School Year Begining 1906–1907

	NEW PUPILS ADMITTED	PUPILS WITH BLINDNESS DUE TO OPHTHALMIA NEONATORUM		
School Year	*Total Number*	*Number*	*Per Cent*	*Five-Year Average Per Cent*
1906–07........	206	58	28.2	
1907–08........	290	77	26.5	
1908–09........	300	68	22.6	
1909–10........	325	67	20.6	22.8
1910–11........	351	84	23.9	
1911–12........	415	88	21.2	
1912–13........	386	88	22.7	
1913–14........	428	84	19.6	
1914–15........	602	91	15.1	18.7
1915–16........	666	127	19.1	
1916–17........	647	119	18.4	
1917–18........	614	90	14.7	
1918–19........	622	105	16.9	
1919–20........	749	174	23.2	16.6
1920–21........	702	95	13.5	
1921–22........	760	108	14.2	
1922–23........	738	97	13.1	
1923–24........	714	91	12.7	
1924–25........	800	92	11.5	12.0
1925–26........	776	101	13.0	
1926–27........	694	66	9.5	
1927–28........	774	72	9.3	
1928–29........	695	66	9.5	
1929–30........	740	68	9.2	8.4
1930–31........	908	68	7.5	
1931–32........	899	63	7.0	
1932–33........	810	54	6.7	
1933–34........	422	28	6.6	
1934–35........	495	32	6.5	7.0
1935–36........	441	40	9.1	
1936–37........	596	40	6.7	
1937–38........	638	47	7.4	

NOTE: Actual number of cases shown in table should not be used to show trends since the number of schools from which figures are available differs from year to year. Even in the later years figures do not include all schools in the country.

Chart Showing Decrease in Cases of Blindness Due to Ophthalmia Neonatorum, Entering United States Schools for the Blind

1906–07 to 1937–38



The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

The Story of a Fireworks Bill

Background of House Bill 305—Woodside—an Act (65) to prohibit the sale and use of fireworks in Pennsylvania.

An ordinance prohibiting the sale and use of fireworks in Philadelphia was passed by City Councils in 1921 and honest effort was made to enforce it; but each year thereafter bootleg fireworks found their way into the city and 4th of July celebrating took a gruesome toll in burns, lacerations and, not infrequently, blinded eyes and death.

The Philadelphia Committee for Prevention of Blindness, which came into being February 15, 1936, began immediately to take stock of wasted eyes and other evidence of crippling, and two months later planned an educational campaign to stimulate civic interest in making the Fireworks Ordinance effective. More 4th of July accidents were reported that year than ever before.

A similar but more ambitious program was set up in 1937. Public and private agencies, churches, radio, and the press united wholeheartedly in an effort to make Philadelphia safe for children. Nearly all hospitals reported fireworks accidents they treated—201 was the crop that year.

All injuries to eyes were followed and all recommendations for treatment were carried through. An effort was made to locate the source of supply of offending explosives but very little substantial information was secured. Even though the toll of accidents that summer was high we noted with satisfaction a growing sentiment against fireworks and we seized the opportunity to begin talking in terms of a state law to control their sale and use.

Early in 1938 we organized an Eye Safety poster contest in the Philadelphia high schools and asked that emphasis be placed on the

hazards of 4th of July celebrating. The winning poster was reproduced and 43 Boy Scout Troops distributed them for display a week or two before the 4th. Eventually the entire Scout membership, 11,000, was organized to watch city blocks and report any evidence of selling or shooting off firecrackers. More than 1,000 churches made announcements from pulpits and published warning articles in their bulletins. The Pennsylvania and Reading Company Railroads distributed posters. The Philadelphia Chamber of Commerce came out publicly in support of our efforts. The police officers were charged with the duty of patrolling every city block and they were further directed to provide transportation for all injured persons to nearby hospitals for treatment. Then they stopped around later for reports as to the extent of the injuries and the physician's prognosis.

Local radio stations started their publicity June 22. More than 100 "spots," talks and electrical transcriptions, which set forth the danger from fireworks, were presented.

All newspapers issued warnings and urged parents to join in the crusade to stop needless waste of life and eyes.

On July 5 wartime headlines announced the frightful news of 402 accidents. Children hovered between life and death, eyes had been blinded, fingers blown off and countless bodies were smarting from cruel burns.

The *Philadelphia Inquirer* came out with Fred G. Hyde's famous story: "We, Who Are Hurt, Now Beg. . . . Stop the Sale of FIREWORKS." A city was awake!

Just at that moment the State Legislature was about to be called into special session. If a model fireworks bill could be introduced in the "Call," we believed it might ride through on the current wave of public opinion.

The Governor was beset with demands for action and the State Council for the Blind rallied gallantly to our support in arranging for him to speak, over a state-wide hook-up, on the urgency of fireworks control. The speech was not to be given unless he was willing to announce his intention of asking the General Assembly to enact a prohibitory law. He made that announcement.

No sooner was the Legislature in session than fireworks bills became popular and many of all sorts were introduced.

The administration measure, House Bill 22, was defeated in the Senate by two votes. But public sentiment was not defeated and the subject was kept alive through organized effort until January, 1939, when the State Legislature met in regular session.

The Philadelphia Committee for Prevention of Blindness prepared House Bill 305 and it was introduced February 27. The *Philadelphia Inquirer* kept the subject constantly

at white heat with feature stories and editorials. Five other bills were introduced all except one of which were regulatory. Fireworks manufacturers kept a powerful lobby active constantly. There were controversy, delayed action in Committees, and amendments but finally No. 305 passed the House, as it was introduced, 169 to 8.

Bitter strife greeted the measure in the Senate and we had every reason to believe that it would never come out of Judiciary Special Committee, but The *Philadelphia Inquirer* hammered away with two or three stories every day; our small committee organized all but eight of Pennsylvania's sixty-seven counties in a concerted drive for enactment of the prohibitory law. Copy was sent to every daily newspaper in the state. There was a public hearing and fireworks manufacturers spoke loud and long in favor of 2″ firecrackers, caps with .35 grain of powder, Roman candles with nine explosive compartments and other types of noise makers. The American Legion fought for toy pistols—they said there was a great deal of sentiment in the Legion about carrying a gun and they did not want their children and grandchildren deprived of that great privilege. The "sentiment" probably was responsible for H305 being amended in Judiciary Special to include paper caps and toy pistols.

Finally, when Pennsylvania spoke as one voice demanding a prohibitory fireworks law, 305 came out of the fiery furnace of controversy with only one change from its original state. It permits the use of paper caps with no more than .25 grain of powder. The Senate passed it and the Governor's signature was affixed May 15, 1939. The pen Governor James used was presented to the Philadelphia Committee for Prevention of Blindness, as a souvenir.

—EVELYN M. CARPENTER
Philadelphia Committee for Prevention of Blindness, Inc.
Philadelphia, Pa.

News of State Activities

THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Brief and timely items only can be used, because of the limitations of space

Louisiana

"*Fireworks Campaign.*—Four-year campaign against the sale and use of fireworks conducted by our Society. City of New Orleans adopted fireworks ordinance in response to strong city-wide feeling, after scores of men, women and children were injured, many of them permanently, in the January, 1938, New Year celebration. Strong appeal made by our Society through the media of the press, radio and civic clubs, for rigid enforcement of the ordinance during the 1939 New Year celebration. Campaign resulted in a possible five or six injuries as compared with more than 400 for the year 1938.

"*Sight-Saving Classes.*—Sight-saving class established in Jefferson Parish. Class located in Gretna Primary School No. 1. Enrollment of ten students.

"*Parish Branches.*—The Society has added two new branches to our parish organizations. We now have six organized parish branches functioning under the direction of our Society. Chairmen have been selected from the medical profession and from among public-spirited citizens who are interested in helping our organization save sight.

"*Swimming Tank Conjunctivitis Campaign.*—Through co-operation of the State Board of Health, active campaign conducted to help eliminate 'pink eye.' Posters displayed in public swimming pools of the state."

—*Louisiana Society for Prevention of Blindness,*
New Orleans, Louisiana

New Hampshire

"The talking slide film, 'The Nurse's Responsibility in Saving Sight,' has been used by the Sight Conservation Program of the

New Hampshire State Department of Public Welfare for educational purposes in four schools of nursing. At a public health nurses' meeting, the picture was used for demonstration while an ophthalmologist gave an interesting and instructive talk on sight conservation. Many nurses who have seen the film have made suggestions as to where it could be used to advantage in different sections of the state. We have received many fine testimonials.

"On June 15 and 16, the annual meeting of the New Hampshire Medical Society was held. The New Hampshire Department of Public Welfare had an exhibit which many doctors as well as lay people visited. The House of Delegates of the State Medical Society approved a Medical Advisory Committee on Eye Conditions to the State Welfare Department to include six ophthalmologists."

—*Sight Conservation Program, State Department of Public Welfare, Concord, New Hampshire*

Ohio

". . . During the two-year period in which the Commission's eye survey plan has been in operation, 60,000 school children have been cleared and over 500 serious eye conditions were detected which never previously had been suspected by local authority. Approximately 80 per cent of that group has received remedial care to the point where the condition has been 'permanently' corrected and the remainder are under observation or treatment. In addition to this number, several thousand displaying a need for refraction have been returned to parents or local service groups for this 'better sight' expedient.

"The effectiveness of this type of service is demonstrated in a number of ways, not the least significant of which is a reported 40 per cent reduction in classroom failures in one city system within a semester after completion of the survey.

"During May, 1939, we have conducted such a school eye survey in Mansfield city schools, Xenia city schools and in Green County schools. The immediate result of these services has been to strengthen the provision for sight-saving activity in the districts concerned and to insure better sight for the 250 school children clinically examined, and immediate surgical assistance to 25 serious cases.

"It is understood that the Commission is the only public agency that has established an extensive formalized survey of this nature to date."

—*Ohio Commission for the Blind, Columbus, Ohio*

Pennsylvania

"*Legislation.*—Several measures concerned with the prevention of blindness were introduced and enacted into law at the 1939 session of the State Legislature. A prohibitory Fireworks Bill, introduced and sponsored by the Philadelphia Committee for the Prevention of Blindness, became effective as of May 15, 1939, when it was signed by the Governor. This bill prohibits the use and sale of fireworks, except caps of 25/100 grains or less, unless used for licensed displays or other regulated purposes. A Reporting Bill introduced to amend the Act of 1913 regarding ophthalmia neonatorum was also sponsored by the Philadelphia Committee for the Prevention of Blindness. This bill, passed by the legislature but not yet signed, requires not only the reporting of finding of cases of ophthalmia neonatorum, but also the result of treatment. Two Syphilis Control Bills were introduced, relating to premarital and prenatal Wassermann tests. The bills will become effective in May, 1940.

"*Personnel.*—Miss Edith Gutzeit, formerly assistant to the supervisor of the Prevention of Blindness Department of the Pittsburgh Branch of the Pennsylvania Association for the Blind, has become the prevention of blindness worker for the Dauphin County Branch of the Association. Miss Sarah Moody, formerly with the Northampton County Branch, has recently been appointed assistant to the Supervisor, Conservation of Vision, State Council for the Blind at Harrisburg."

—*Prevention of Blindness Department, Pennsylvania Association for the Blind, Pittsburgh, Pennsylvania*

South Carolina

"The Department of Prevention of Blindness, as such, in the State of South Carolina has been existent for little over a year. It is under the Division for the Blind of the State Department of Public Welfare and is a separate unit from that of the Department of Public Assistance, which administers monthly grants to the needy blind and which is charged with the prevention of blindness and restoration of vision to persons with visual acuity of 20/200 or less in the best eye with best correction.

"With the co-operation of County Departments of Public Health, County Departments of Public Welfare, and lay persons in the community, the Division has conducted screening clinics in several counties in which there is no resident ophthalmologist. The clinics were generally and extensively advertised before the opening date and were available to all. As with school children, persons with

poor visual acuity were referred to the County Departments of Public Welfare for financial investigation. Those who were actually unable to obtain necessary services for themselves were notified to attend subsequent treatment clinics conducted by a qualified ophthalmologist. . . . When operations were advised, arrangements were made. When clinic examinations indicated need for further related treatment, the cases were immediately referred to the Department of Public Health.

"The State Department of Public Health submits weekly reports to our Division, referring all cases of opthalmia neonatorum reported to them. Our staff endeavors to follow these up and see that necessary treatment is given. As a result of this activity we found one baby whose eyes were in a very serious condition and required heroic treatment. She was hospitalized and her vision saved.

"The State of South Carolina has had no law making mandatory the use of a prophylactic in the eyes of newborn infants. Realizing that this need was fundamental in any program for the prevention of blindness, the Division worked toward passage of such a bill and is happy to report that this piece of legislation was enacted at the recent meeting of our General Assembly."

—*Division of the Blind, State Department of Public Welfare, Columbia, South Carolina*

Tennessee

"In the educational campaign which is being conducted by this Division, the talking slide film, 'The Nurse's Responsibility in Saving Sight,' prepared by the National Society for the Prevention of Blindness, has been utilized quite extensively. It was received by this Division in October of 1938 and during the past eight months it has been shown eighteen times before various groups such as nursing groups, parent-teacher associations, and one large group of social workers, reaching in all some 1,600 persons. In addition to the showing of this film, the head of this Division has always followed it with a short talk, adaptable to the group before which the picture was shown, on what that particular group could contribute to the prevention of blindness in their community and state, as well as on the causes of blindness in Tennessee, and their prevention. I feel that this film has been invaluable to me in my educational campaign and this Division will attempt to make this film available during the years to come to any group in the state making request for it. The head of this Division has also made some twenty-five talks to various groups over the state on the causes of blindness in Tennessee and their prevention, and it is hoped that he will be able to appear before many more groups in the years to come.

"The other major activity to which this Division is devoting a lot of its time is the establishment of sight-saving classes throughout the state. One class was established in September of 1938 in Nashville which cared for eleven visually handicapped children, and another is being planned to be established in Nashville in September of 1939 to care for the pre-high and high school grades, thus making available to visually handicapped children of Nashville a complete sight-saving class set-up from the first grade through the twelfth. A teacher for this class is to be trained this summer at Western Reserve University at Cleveland, Ohio, by a scholarship, established by the Centennial Club of Nashville, which is given annually for the training of a sight-saving class teacher or for the purchase of equipment for such a class. Last year this scholarship was used to purchase equipment, but the Centennial Club prefers that it be used in the future for the training of a teacher. The superintendent of the Tennessee School for the Blind is also planning to establish a sight-saving class in his school to care for children eligible for sight-saving classes. . . . Last year, 48 children attended the Tennessee School for the Blind, who had sufficient vision to enable them to obtain their education in sight-saving classes if they had been in existence in their communities. It is estimated by the head of this Division that Tennessee requires 83 such classes, and it is hoped by September of 1939 that four such classes will be available—one in the Memphis city school system, two in the Nashville city school system, and one at the Tennessee School for the Blind."

—*Division of Prevention of Blindness and Conservation of Vision, Department of Institutions, Nashville, Tennessee*

Washington

"Causes of blindness for 1,573 recipients of blind assistance in the State of Washington have been determined in a study just released as Publication No. 5, by the Division for the Blind, State Department of Social Security. Assisted by Dr. Purman Dorman, ophthalmologist, who serves as chairman of the Medical Eye Advisory Committee to the Division, staff members studied the characteristics of the blind, general diseases and local conditions causing blindness, major etiological classification, major topographical classification, and treatment by medical and surgical means.

"Among significant discoveries revealed by the study was the fact that blindness is definitely an affliction of the older ages, the median age being 66.5 years. With the exception of the 4.5 per cent who were born blind or who became blind in their first year, comparatively few individuals included in the study became blind until their 39th or 40th year.

"The study points out that, as age increases, infectious diseases which had their onset at a previous time begin to cause blindness. . . . It shows further that at the time of the initial eye examination, the examining physicians considered that the vision of one-sixth of the persons could be improved, or that further loss of sight could be prevented by surgery or other treatment. The possibility for improvement in vision by surgery was considered feasible for a larger proportion of persons in the older age groups than in the younger. This is due undoubtedly to the larger number of cataract cases among older persons. In the group 65–74 years of age, 21 per cent were recommended for treatment; in the group 75–84 years, 19 per cent; in the group 85 years and older, 16 per cent; while in the group under 35 years only 10 per cent received such recommendation. The 255 who were recommended for treatment had a median age of 69.4 years and the 1,318 not recommended for treatment had a median age of 65.9 years.

"In the field of prevention of blindness, it is indicated that, of the entire group studied, 11 per cent of the infectious diseases might have been or may yet be helped. In addition, 15 per cent of blindness from injury and 10 per cent of the congenital and hereditary types may yield to some form of treatment even though the patient has very poor vision. Many more might have been helped, according to the report, if the pathological process had been treated earlier, before actual blindness occurred.

"When those afflicted with conditions that cause blindness seek competent attention early, according to the study, these percentages will change and few persons will be irrevocably blind.

"Reports on surgical treatment indicate that during the 1937–1939 biennium 113 persons received operations. In addition, ten series of treatments were given in an endeavor either to prevent vision from becoming lost or to protect that little vision which remained."

—*Division of the Blind, State Department of Social Security, Olympia, Washington*

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from The Sight-Saving Review. New publications will be announced quarterly.

295. The Rôle of Light in Education, N. Bishop Harman, F.R.C.S. 16 p. 10 cts. A history of the lighting of schoolrooms in Great Britain, including a discussion of the subject of daylight as well as artificial light.

296. The Head and Eye Protection Code of the National Bureau of Standards, M. G. Lloyd. 8 p. 5 cts. The author presents the history, the extent of application, and the effect of application of the head and eye protection code.

297. Fifteen Years' Progress in Eyesight Conservation in Industry, Louis Resnick. 12 p. 10 cts. Advances, remaining problems, cost of industrial accidents, and recommendations are discussed in this article.

298. The Industrial Eye Protection Program: How is it Set Up? How is it Put Across? How is it Kept Across? Harry Guilbert. 8 p. 5 cts. The author presents the economic as well as the humanitarian arguments for making the use of goggles in a plant a mandatory rule of employment.

299. Vision and Eye Protection: A Symposium. 28 p. 15 cts. This publication comprises Publications Nos. 296, 297 and 298, with an introduction by Dr. Leonard Greenburg, who was chairman of a meeting during the Greater New York Safety Council, March 27–8–9, dealing with this subject, at which these papers originally were presented.

300. Modern Conception of Conservation of Vision, Conrad Berens, M.D. 8 p. 5 cts. The author presents a popular article on some common problems of eye hygiene from youth through old age.

301. Prevention of Blindness from Ophthalmia Neonatorum. 28 p. 15 cts. This report was prepared in co-operation with the National Society for the Prevention of Blindness through its consultative relationship with the Committee on Conservation of Vision of the State and Provincial Health Authorities of North America. It has brought up to date material previously published in D63, "Prevention of Blindness in Newborn Babies," published in 1930.

302. The Story of a Fireworks Bill, Evelyn M. Carpenter. 8 p. 5 cts. This is the history of Pennsylvania's fight to get a fireworks bill which would be efficacious in preventing serious consequences.

Contributors to This Issue

N. Bishop Harman needs no introduction to prevention of blindness workers throughout the western world. In addition to his many activities in Great Britain, he is an honorary member of the International Association for the Prevention of Blindness.

M. G. Lloyd is Chief of the Section of Safety Codes of the National Bureau of Standards in Washington, D. C.

Co-author of "Eye Hazards in Industrial Occupations," **Louis Resnick** is Director of Industrial Relations of the National Society for the Prevention of Blindness, Inc.

Harry Guilbert is the Director of the Bureau of Safety and Compensation of The Pullman Company, and has for many years been a guiding spirit in accident prevention in industry.

Conrad Berens, M.D., a member of the Board of Directors of the National Society for the Prevention of Blindness, is a practicing ophthalmologist in New York City and surgeon and pathologist of the New York Eye and Ear Infirmary.

The Sight-Saving Review

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Table of Contents

Prevention of Blindness as Seen by a Commission for the Blind*

William E. Bartram

A COMMISSION for the blind, the author points out, should serve as a resource agency for all welfare and health workers who are faced with case situations involving suspicious eye conditions.

THREE thousand years ago mankind recognized that blindness is preventable; and those master scientists of their day, the ancient Egyptians, labored so mightily to preserve for the chosen of their race enjoyment of the beauties of their homeland that they brought forth a treatment which was an effective shield (for those to whom it was available) against the scourge of trachoma, which respected no social barriers and left its victims in total and permanent blindness. In that treatment, so much a part of the life of the elite of ancient Egypt that today scarcely a tomb is opened which does not disclose its little store of copper sulphate crystals as mute evidence of that early organization of resources for the prevention of blindness, civilized man has placed his hope of sight against the onslaughts of trachoma for three thousand years.

What a tragedy that that first organization of resources was on a basis so class-conscious and so socially unconscious that the fellaheen were to present to our day a sordid spectacle of suffering and disease menacing the happiness of all mankind! If there be any excuse for calling man, in all of his modern absurdities, "enlightened," possibly it may be found in his—but lately and not yet too clearly—perceived need to combat disease in every stratum of the social order. In this he may surpass finally in wisdom those ancients who never learned that that which devastates the least of his fellows may devastate all, and so left to posterity a terrible heri-

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tage. Well may we say that man's real progress may be traced in the development of services to his fellows, that he is "enlightened" in the degree to which he serves, and that governments—which are the instrumentalities of man—are worth while to the degree to which they make their subject peoples beneficiaries of their intellectual and scientific patrimony.

I have heard divers estimates as to the number of blind in this country. I have heard varied opinions as to the percentage of those who might have been spared this condition. It seems to be a commonly accepted belief that, aside from certain hereditary eye conditions, most eye defects are either amenable to early treatment or correctable in later stages. It is relatively unimportant as to whether there are within our national population 65,000 blind persons, as one source discloses, or 125,000, as another alleges. It is not significant to our thinking now whether there existed conditions 30 years ago—or even three years ago, for that matter—which permitted today's totals. It is important that we determine beyond reasonable doubt that every individual known to us as a blind person must remain so. And it is highly pertinent that social agencies and socially-minded individuals understand our now present ability to determine just this vital point. It seems to me that a state commission for the blind can serve most usefully by advancing the common understanding of this; and, incidentally, by adhering strictly to screening processes in carrying out its own service functions within its area of operation.

While the restoration of sight through surgical interference may not in some instances be—in a literal sense—prevention of blindness, definitive distinction is so fine as to be little more than a moot point. Obviously there can be no ultimate realization of objectives if lines are drawn between medication which prevents or arrests, and surgery which arrests or restores. Too few public health or welfare organizations recognize the importance to a community of complete integration of effort in promoting eye health. In spite of the stimulating results of federal, state and local co-operation in health and welfare, there are large areas within our national boundaries without competent eye service. And in sections where such service is available there are unnumbered individuals who, able to eke out a bare existence, have remained beyond the ken of the pub-

lic assistance agencies. Needing eye care, these individuals of low income consider the private oculist beyond their financial reach and the public oculist denied them by bureaucratic regulation or procedures which establish a condition of public dependency. Further, it is not at all certain as yet that even those who are on the active rolls of public assistance agencies are assured adequate care for serious eye conditions, for it would appear that we have not in all sections broken cleanly with the earlier concepts of pension systems and established administratively, for lay recognition, constructive assistance programs.

Factually, elimination of blindness is a responsibility of every agency interested in improving the social structure. An agency for the blind, however, because of its peculiar *raison d'être,* can most readily assume the initiative and accept as its manifest duty the responsibility for seeking integration of all services useful in the preservation of eyesight, and the promotion of adequate facilities for the elimination of blindness.

Medical science is inscribing in the pages of today much that will remain memorable when the long history of man's struggle against the ills that have beset him is finally completed. The discovery of sulfanilamide and its very recent refinement to the less toxic neoprontosil has at last advanced us beyond the technique of those ancient Egyptians to whom I earlier referred. Today a commission for the blind is demonstrating to the public health districts of its state that trachoma can be cured cheaply and with dispatch. And the investigative and treatment techniques evolved in the fight against blindness from trachoma are bringing better health and better living conditions to hundreds of people in the submarginal lands of that state who never heard of the "Egyptian Curse" and know only that the "state nurse" kept them from being like their old folks "who just set around the cabin all day 'cause they cain't see to do anything."

Today there is little excuse for a child to be born with the secret of syphilis in the bloodline, disclosed in later years through his blindness. We know that condition which has filled so many homes with misery and added heavily to the population of our residential schools for the blind—interstitial keratitis—can be prevented in 97 per cent of the cases if proper treatment is made available to the

expectant mother and within the early stages of her pregnancy. There is need for a commission for the blind to promote this knowledge through public agencies which serve so many to whom childbirth is a common occurrence with frequently appalling social results. Of course, if ignorance or public indifference prevails and a child is born a victim of prenatal syphilis, and interstitial keratitis develops, there is at "long last"—in neoprontosil—some hope of reclamation. But as some sage long ago remarked, "an ounce of prevention is worth a pound of cure."

A commission for the blind should establish itself as a resource agency for all welfare and health workers who are faced with case situations involving suspicious eye conditions by acting through its medical staff in consultant capacity, by supplementing with service where local facilities are inadequate, or by providing—entirely at its own expense if need be—prompt diagnosis and treatment.

One of the devices which is proving of particular value as a medium for public education in eye hygiene and, at the same time, for discovering incipient eye difficulties early enough to enable effective preventive service, is the school eye survey. This has been established on a formalized basis by the Ohio Commission for the Blind as an interdepartmental project. For many years this commission for the blind made investigations of individual referrals for the Ohio State School for the Blind and the Division of Special Classes (administrative division of the State Department of Education in charge of sight-saving classes in the public schools), and advised on educational placement of visually handicapped children.

Within recent years the development of a closer relationship between the State Departments of Health and Welfare and county health and welfare agencies in their mutual interest in the execution of duties devolving upon them through the state's conformance to the several titles of the Federal Social Security Act, afforded the Ohio Commission for the Blind an excellent opportunity for more detailed planning in community organization for prevention of blindness. Also, certain functions embodied in administration of aid to needy blind—especially the review and classification of eye records of applicants for relief, and the direction of medical service for the prevention of blindness and conservation or restoration of vision amongst this group—were retained by the Commission after

the creation of a division of public assistance within the State Department of Public Welfare, by agreement with that division.

With state-county working relationships definitely established, the Commission (assuming the initiative with the approval of the State Department of Education) organized its forces for comprehensive surveys of eye conditions within such public school systems as were unable to maintain their own facilities for examination, diagnosis and treatment. Through field clinics which climaxed direct participation by the Commission in the survey, necessary services for the correction of defects encountered were determined, classified, and assigned in accordance with the accepted responsibilities of all participating agencies. It may be of interest that sequelae immediately discernible are so varied and influent on the local social pattern as to characterize this as a project for "community betterment."

One school survey disclosed an alarming amount of eyestrain among the younger children and a high percentage of myopia in the student body, and led to immediate revision in school lighting conditions, work schedules, and supervised leisure-time activity. In the semester following the survey, classroom failures fell off 60 per cent. Certain home situations which were puzzling the school authorities appeared to adjust themselves, and the juvenile court advises that there has been a marked decrease in child delinquency.

Another development no less significant was local agitation for—and eventual establishment of—a sight-saving class. Among the more interesting individual situations encountered in that same survey was that of the ten-year-old girl with a previously unsuspected brain tumor (operated immediately as an emergency lifesaving measure); a seventeen-year-old high school girl with an unreported active trachoma employed after school hours in a local hotel dining room (immediately hospitalized in a federal facility and successfully treated); a seven-year-old with interstitial keratitis (which led into a home and the discovery of several younger children who were luetic and a mother again pregnant and not previously known to the local health office).

There are any number of warm human interest stories concealed within the pages of cold and formal running case records. On the

other hand there are many tragedies buried within them too; and their underlying causes are not always easy to discern nor are the facts easy to establish. But there is one fact that becomes increasingly apparent to anyone who has "served time" in a social agency. That is, that so many disadvantaged people do not seek help from a public assistance agency until they have exhausted all of their own pitiful resources and have reached a stage of hopelessness. Though there may be a change taking place in the national consciousness, there is a substantial minority of our citizens for whom the "psychology of relief" has not been altered, and they are "sensitized" to a faint "aura of disrepute" which they seem to perceive about those who receive public aid. Strangely enough, this "aura" is not so perceptible about the clients of a public agency which provides services rather than financial assistance. And for that reason, if for no other, a commission for the blind, characterized in the popular fancy as a "public service" agency, must continue to seek such of those threatened with blindness who are in need and will not admit that need; and carry on this form of public assistance as a public service function in areas where prejudice against public relief—fiscal or medical—is still rife. Everywhere we are organizing for public assistance on an undifferentiated basis administratively, and are in danger of overlooking the "minor problems" under the pressure of major ones. Let us be wary lest, in seeking surcease from the pangs of our ailing economy, we mistake the palliative for the cure and so, as our ancient preceptors before us, organize our resources for the prevention of blindness on a basis that is so class-conscious and so socially unconscious as to leave—in the hands of those who are too proud to accept that which they do not recognize as public service—a heritage of suffering for all posterity.

Prevention of Blindness as Seen by a Private Agency*

John Williams Avirett, 2d

THE author shows what can be done by a volunteer agency on a limited budget to conserve sight on a state-wide basis, citing the experience of the Maryland Society for the Prevention of Blindness.

IT HAS been suggested that I tell you something of the work and problems of the private agency of which it is my privilege to be the head, namely, the Maryland Society for the Prevention of Blindness. I do so gladly.

Nature of Maryland Society

The Maryland Society was organized in 1909 for the purpose of teaching means of preventing blindness in Maryland, educating the general public in the use of such means and co-operating with other organizations in furthering these ends. It is a private agency, quite independent of public authorities and governmental departments with which it co-operates. Serving on its Board of Directors and Advisory Board are ophthalmologists, obstetricians, representatives of the public school and health authorities, lawyers, other civic leaders and individuals interested in the work of the Society. Its paid staff consists of an Executive Secretary and her secretarial assistant, and its work is financed by The Community Fund of Baltimore City and private generosity. For the past several years it has operated on a budget of approximately $4500 per year.

Nature of Work

The work of the Society is primarily educational and promotional —teaching and promoting the use of those simple and inexpensive

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ounces of prevention by which sight can be conserved and blindness and defective vision prevented. The varied activities of the Society fall into four general groups: educational, promotional, clinical and legislative.

Educational Activities.—Its educational activities are carried on through lectures, exhibits, motion pictures, newspaper articles and radio programs. At every opportunity we try to teach those responsible for the sight of children:

1. The vital importance of prenatal care of expectant mothers and of the use of drops of silver nitrate in the eyes of newborn babies;
2. The dangers to vision from childhood diseases such as measles, scarlet fever and diphtheria;
3. The importance of examining the eyes of children before they are permitted to undertake the eyestrain of school work;
4. The necessity for proper lighting;
5. The need for using protective devices to safeguard the eyes of workers in certain industries;
6. The tragic threat of fireworks and air rifles to the eyes of children; and
7. The many other ABC's of eye care.

Promotional Activities.—By promotional activities I mean those which stimulate other agencies and authorities to carry out sight conservation projects in their respective fields. For example—encouraging the school authorities to establish sight-saving classes for the visually handicapped; or stimulating the health and school authorities to conduct routine vision tests of school children. The Maryland Society has always been active in promoting such projects in Maryland; and today every child attending public school in Baltimore receives routine vision tests periodically and we have 10 sight-saving classes in the public schools of the City.

Clinical Activities and Furnishing Glasses.—In recent years there has been an increasing demand upon the Maryland Society by needy persons for clinical treatment and for glasses. Individuals needing diagnosis and treatment are constantly referred to us, particularly by public authorities and other private Community Fund

agencies. With a staff of two and a budget of $4500, we are not properly equipped to do such work, but with the co-operation of hospitals, oculists, dentists, nurses, physicians, volunteer workers, and others, we find ways and means of giving such individuals the attention needed to conserve and improve their vision. The following are examples of such services:

> A syphilitic expectant mother comes to the attention of the Society. The vital importance of prenatal care and treatment is explained to her and arrangements made for her transportation to and from a public venereal disease clinic for treatment. A healthy child is born with sound eyes. In the absence of proper prenatal care and treatment of this mother, her child might have been born blind and destined to become a charge on the Maryland School for the Blind and a drain on the Blind Pension Fund of the State.
>
> A little colored girl with congenital bilateral cataracts is referred to the Society. Through an eye clinic arrangements are made for the necessary operations. As a result, the little girl now has partial vision and with cataract lenses secured through the Society is eligible for admission to a sight-saving class in the public schools, rather than destined for a school for the blind.
>
> An adult, totally blind from cataracts, is referred to the Society. The patient is taken to an eye clinic in which a public bed is available and arrangements are made for the necessary operations. As a result, she now has one good eye and, with a cataract lens obtained through the Society, has good vision.

During the past two years the efforts of our Society have resulted in 45 operations for cataracts, glaucoma, strabismus, detached retina, and other causes of defective vision or blindness.

Requests for glasses present an increasing and extremely difficult problem. We do not have adequate funds to meet the demands, but we try to take care of the most needy: (1) By referring particularly appealing cases to civic or service organizations, such as the Lions Clubs, which make prevention of blindness their chief charitable objective; (2) By securing substantial discounts from charitably disposed opticians; or (3) In very urgent cases by purchasing glasses with funds donated to the Society for that specific purpose.

During the past year a total of over 400 needy persons obtained glasses through our Society after their cases had been investigated and approved by a special committee.

Legislative.—The Maryland Society has taken an active part in securing the passage of every law of Maryland and every Baltimore City ordinance aimed to conserve sight and prevent blindness, and it has now become the clearinghouse and spear-head for all such efforts in Baltimore and throughout the State.

State laws requiring the treatment of newborn babies' eyes with drops of silver nitrate, regulating and licensing midwives, and requiring the use of safety glass in automobiles, and City ordinances making ophthalmia neonatorum a reportable disease and prohibiting the sale and use of air rifles in Baltimore are examples of legislation which we have been instrumental in securing.

Because many injuries to the eyes are caused by fireworks, our Society has been working for years to secure the passage of legislation prohibiting the promiscuous sale and use of fireworks in Maryland.

In 1927 the Society helped secure the passage of the Baltimore City ordinance prohibiting the sale and use of fireworks in Baltimore, and in 1932 and 1934 helped defeat attempts of commercial interests to have this ordinance modified.

In 1935 we led the fight for the passage of a statewide law prohibiting the promiscuous sale and use of fireworks in the State. Defeat in this fight taught us the need for accurate statistics concerning the nature and extent of fireworks accidents in Maryland. Accordingly, we planned and with the co-operation of the health, police, medical, fire prevention and other authorities, conducted statewide surveys in 1937 and 1938. They were accurate and comprehensive and, as many of you know, the report of the 1937 survey was published in The Sight-Saving Review. These surveys indicated that more than 20 per cent of the injuries caused by fireworks in Maryland were to the eyes or to the face and neck near the eyes and further convinced us of the great need for statewide legislation. We therefore decided to renew the fight for such legislation and prepared an act which followed closely a model fireworks act approved by national safety groups. Such an act was introduced in the General Assembly of Maryland in February of this year and

with the co-operation and active support of the press and substantially every organization in the State interested in the sight, safety and welfare of children, our Society led the fight for its passage. After an intensely bitter fight and under circumstances which were a disgrace to the State, commercial and political interests succeeded in defeating the bill by one vote in the Senate, after it had passed the House. As a result of this fight, the Maryland Society, its purposes and the nature of its work are today more widely known throughout Maryland than at any time in the thirty years of its existence.

We propose to carry on the fight and toward that end are already at work.

Appraisal of Program

Such, in brief, are the types of activities in which the Maryland Society is engaged. The work is dynamic and constantly expanding. Changing conditions present new needs, new problems, and new opportunities. Increasing demands call for a critical appraisal of the relative values of the services performed and a determination of the particular fields in which we can most efficiently and effectively operate.

In making such an appraisal one may well ask whether or not a private agency engaged in sight conservation should engage in clinical activities and the furnishing of glasses.

Such clinical case work as is undertaken by the Maryland Society has tremendous appeal. It is dramatic, colorful, and intensely satisfying. Furthermore, it is the source of human interest stories which can be used effectively in relatively more important educational and promotional projects. Yet, it is obvious that such an agency as the Maryland Society with its small budget and staff cannot major in handling such case work, and whether or not a private agency such as ours should attempt to act as a clearinghouse for such clinical assistance is a serious question.

As for furnishing glasses, it does not seem to be a proper activity for a private agency with limited resources, the purpose of which is essentially educational and promotional. Yet there is in Maryland, and probably in other states, an increasing demand for some central clearinghouse for furnishing glasses in deserving cases.

Being looked upon as the proper agency to handle such matters in Baltimore, the Maryland Society is now in the position where it is extremely difficult to drop this phase of the work. We are becoming more strict in granting requests for glasses, however, and, as a result, more organizations referring persons to us now pay for their own cases and more persons securing glasses at a discount through us pay for their own glasses.

My experience with the Maryland Society convinces me that a private agency engaged in prevention of blindness can function most successfully in educational, promotional, and legislative activities.

Educational Function.—The first and fundamental step in any prevention of blindness program is that of spreading the word that almost two-thirds of all blindness can be prevented. It does not require a physician, a health officer or a professional social worker to tell effectively the story of the simple ounce of prevention by which so much blindness can be prevented, and it is frequently more effective to have this story spread through a community by well-known civic leaders. The very fact that they are interested in such a matter commands attention.

Promotional Activities.—By its very nature a private agency is particularly well adapted to conduct promotional activities. Such an agency, being independent, is in a position to function freely as a sort of "Socratic gadfly" in the community in which it operates.

School and health authorities have their hands full with all sorts of problems. It is no reflection on them that it sometimes requires an enlightened and independent pressure group to focus their attention on a particular problem. In this rôle the members and the board of directors of a private agency can be most effective.

For example, sight-saving classes, while economical in the long run, cost money. The chances of their being established in the public schools of a particular community are immeasurably increased if a private prevention of blindness agency is actively on the job in that community. The same is true with respect to lighting conditions and routine vision testing in the schools.

A recent project of the Maryland Society furnishes a good example. School children in Baltimore City receive routine vision tests, but such is not the case in some of the surrounding counties.

Recently our Society helped to stir up the problem in one of these counties. The usual word came back—insufficient personnel and lack of funds to do such work. We were then asked to do some testing in this county; and did so with the co-operation of a group of volunteer Junior League girls instructed by our Executive Secretary and led by a member of our Board. Snellen chart tests were given to over 1,000 children, of whom more than 700 were found to need watching for signs of eyestrain and more than 50 were found to need ophthalmological examinations. Fifteen were found to need immediate attention.

In a striking way this project brought home to the public authorities and the parents of that county the real need for routine vision tests of school children and I am quite confident that it will not be long before the parents of that county will insist that their school and health authorities provide the means and the personnel whereby such testing can be made routine in their public schools. Thus, from the small promotional activities of a private agency will have sprung a much-needed public project of sight conservation.

In this connection the private agency has another important function. Being independent of public authorities, it should, when need be, direct friendly criticism at such authorities. If, for example, a private prevention of blindness agency learns of changes in the technique of vision testing and is convinced that the procedure used in its community is antiquated, it can and it should investigate and direct public attention toward the problem.

Legislative Responsibilities.—It is particularly important that a private agency undertake legislative projects. For obvious reasons, representatives of governmental agencies and entrenched bureaucracies are not in a position to lock horns with political authorities and carry on a vigorous and independent fight for legislation to which there may be organized opposition. On the other hand, in a fight for such legislation, a thoroughly independent group of civic leaders, whose sole interest is known to be prevention of blindness, can strike out fearlessly at any and all selfish, political, professional or commercial opposition, letting the chips fall where they may. Furthermore, legislative activities properly conducted can be a very effective instrument of education. The loss of our 1939 fight for the fireworks bill in Maryland was discouraging, but we know that

it and the tremendous publicity our Society and its purposes received for leading the fight had untold educational value.

Conclusion.—Economy and Humanity

One final point: Those who have undertaken or are considering the organization of a private agency to engage in prevention of blindness should have no difficulty in securing enthusiastic support for and participation in the work. I know of no social welfare work which is more appealing, particularly because in it economy and humanity so closely coincide.

For example, the economic significance of prevention of blindness in Maryland becomes apparent when you consider the amount of blindness which has been and actually is being prevented by our Society at so little cost, and then consider the fact that the expense of educating a blind child is seven times the expense of educating a seeing child, and that the cost of pensions for the blind in Maryland during 1937 and 1938 amounted to over $200,000. In these days of the increasing and staggering cost of public relief and the sometimes extravagant and questionable expansion of welfare projects, it is refreshing to find a field of social welfare work in which humanity to the needy individual is coupled with economy to the taxpayer.

The humanity of such work is equally apparent, and even more universally appealing. It is not difficult to secure interest and enlist volunteer participation in work, the character of which inspired the following prayer recently offered at the annual meeting of our Society:

> "O God, we thank Thee for the beauty of the world and for the vision by which we see it. Extend the range of our vision and increase the depth of our understanding, that we may appreciate the darkness of those who cannot see. Strengthen our efforts and increase our skill so that no man may ever be born blind, and that no man through human negligence may ever become blind; in the name of Him who made lame men walk and blind men see. Amen."

Prevention of Blindness as Seen by a Social Security Administrator*

Gwen Hardin

THE Social Security Board's responsibility for sight conservation as it is applied in the State of Washington.

TWO years ago in the State of Washington new social security legislation was written on the statute books, covering the assistance program as a whole and certain special programs. As a first step in meeting our obligations under the new law, we were faced with an analysis of what the responsibility of the State Department of Social Security really consists. We found that it consisted of two very definite factors: first, the responsibility of caring for those in need of public assistance; and second—a factor less tangible but really more significant—responsibility of analyzing the causes which led to the need for public assistance, and to find out what could be done to eliminate those causes.

Then it followed naturally that in a division for the blind within the State Department of Social Security we had a responsibility for caring for those who were blind; but that there was also a very real and important responsibility of finding out why these persons were blind and what could be done to prevent or decrease blindness in the state.

We found that the need of a blind person for public assistance is, on the average, 25 per cent more in cost than that of a sighted person in otherwise similar circumstances. So, from a financial point it was an easy matter to justify a program of prevention of blindness without any discussion of a state department's part in protecting the eyes of its citizens. These human values are perhaps more difficult to present to the taxpayers of the state, but when

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people stop to realize that blindness is no respecter of persons, then they realize that prevention itself is of first importance.

Establishment of Medical Eye Advisory Committee

Because prevention of blindness is a technical subject we felt the need of a medical eye advisory committee. In order that this committee might have the backing of the medical men throughout the state we asked the State Medical Association to appoint an ophthalmologist who would serve as chairman, and either appoint committee members to work with him or assign to him authority to appoint his own committee. Only eye physicians who had passed the American board of ophthalmology examination served on this committee. This made available a committee which was representative of the different sections of the state and which had real interest in knowing what the situation was and a desire to better it.

Study of Causes of Blindness in Washington

With the help of the committee it was decided that the first step necessary in approaching this problem of prevention of blindness was a preliminary study of causes. We took the eye reports which were available but which, in many instances, had been made by the general practitioner. These were not the basis for a thorough study but offered something that would serve an initial purpose.

Some very outstanding lacks which were brought to light through this study were the inadequacies of prenatal clinics, of venereal clinics and of general medical service to persons throughout the state, including the opportunity to have eye treatment and eye surgery when the individual pocketbook said "no."

Development of an Eye Report

This study told us also that if we were to have the necessary facts to approach this problem intelligently we must have a more complete physician's eye report. After studying the eye report suggested by the National Society for Prevention of Blindness and those used by other states we developed an eye report which we feel is adequate.

We realized also that it would be necessary to limit eye examinations for our program to those doctors who restricted their practice

to eyes, or eye, ear, nose, and throat. You see our state, while not large in population (we have a population of only 1,600,000 plus), is large in geographical territory, so we do not have many professional men who could restrict their practice to eye work only—and still eat. Our eye report now gives us the etiological and topographical causes of blindness as recommended by the National Society. We found that the eye physicians have been very willing to use this classification.

In addition to the causes of blindness, primary and secondary, we have asked for recommendations for treatment or surgery. We have set up a plan for consultation when there may be a question in the mind of either the examining physician or the technical consultant as to the kind or amount of treatment necessary. By this I mean that if consultation is indicated for the person who can walk in and pay for his medical service then that same consultation is available to the person under our program.

In determining eligibility of persons to receive service for treatment or surgery through our Division a minimum standard budget from our University Home Economics Department is used. This presumes a minimum on which a person employed in private industry can live. We have not yet solved the problem satisfactorily in interpreting the importance of such care to people who can afford to pay for it but fail to do so. We feel that this is a definite part of our community educational program.

Community Education

Too often we find ourselves speaking of community education as though it were a very simple program, perhaps like opening the carrier pigeon crate and away they fly into the community with their message; but just giving the message to a community is not community education. It is a long-time job and takes constant planning and awareness of the opportune time.

To insure initial interest of communities in a program for the prevention of blindness, we arranged with the State Junior Federation of Women's Clubs in 1936 to make a statewide survey of blindness. We worked very closely with them and it gave us a considerable amount of information on which to build our program, but it was much more valuable to us in that we secured the interest of the

members of the Junior Federation of Women's Clubs throughout the state. It was possible to follow the survey in the next year with a study by all of the junior clubs on ophthalmia neonatorum. Rules and regulations in a state department of health, or a state law regarding prophylactic drops is fine and necessary, but equally necessary is the understanding of this need by every person within the state.

Co-operation with Departments of Health and Education

The Division for the Blind in the State of Washington has been in existence for only two years. We had a problem to meet, but there was no place where we could turn to get information on eye conditions of those who had not yet come to the place where they would have to consider themselves as blind persons. We realized that this information was necessary and that probably the most logical place to begin was in the schools. We created a co-ordinating committee representative of the Washington State Departments of Health and Education, and our Division. As a part of the approach to this problem a questionnaire was sent to all school nurses to be filled in school by school. The school nurses gave us every co-operation, and from the questionnaire it was possible for the committee to face the situation as it was and make plans looking toward a program of protection of school children's eyesight.

Co-operation with Nurses and Social Workers

We in the State of Washington are conscious of the fact that the courses of study in public health nursing do not include adequate training in eye conditions leading to blindness. At first we thought this was just a fault of the public health courses in our own state, so we inquired about courses in other states and found that we had as much and even more than many of them. Still we believe there is a real problem to interpret the need of adequate information on the care of the eyes to the student while she is taking her public health course. This is also true of courses for medical social workers. How can we expect our public health nurses and school nurses to safeguard our children's eyes when we have not given them the information with which to work? Institutes, however, will help meet

this need and will augment the greater emphasis which we hope will be given in the regular training courses.

Experience in One County

During this past year it has been possible for us to make an intensive study in one of our counties which combines a fairly large urban center and a truly rural area. In order to have an effective project in this county we went to the Lions Club, which nationally has accepted the blind as a project. Therefore, we felt we were justified in asking them to consider a project of prevention of blindness. They were interested, and accepted it as their project within their own community. They enlisted the interest and co-operation of the superintendents and principals of the schools, the school nurses, the eye physicians, and a group of lay people. It was necessary for us to furnish the plan, the tools with which to work, and even personnel to help do the job, but we were careful that that personnel was a loan to the local Lions Club. It is not possible for a state department to superimpose programs upon a community and be effective. Too often as public agencies we try to cram programs or educational information into the minds of our citizens.

Snellen tests were taken on all children in selected rural schools in this county where the teachers and the school nurses felt that conditions were particularly bad. In other schools tests were taken in certain grades only. The eye physicians donated their services if the family could not afford to pay for an adequate eye examination. The Lions Club furnished glasses and also the cost in connection with treatments insofar as their funds would permit. The Division for the Blind accepted the responsibility of caring for treatment and surgery over and above that which could not be financed by the Lions Club. The power and light company furnished a technician who made an analysis of the lighting of every school in the county.

There have been some very interesting results from this. The eye physicians say that there has been a definite upward trend in eye examinations, adults as well as children, which shows that because this study was given such wide publicity people did become conscious of the need for eye examinations.

Another interesting result is the increase in requests from clubs,

lodges, and service groups in this county for eye physicians and school nurses to discuss prevention of blindness. A third interesting result is that service clubs from other communities are asking whether we will help them plan similar studies for the next school year; so it will be possible during this next year for us to work through local groups to have projects in many other counties in our state similar to the one I just mentioned. Through these projects we believe that communities—well informed and given the necessary information—will adjust lighting conditions in their schools and the type of equipment used in the schoolroom, and, with the co-operation of the school nurses, we shall have the opportunity to give preventive treatment where it is needed rather than care for blind people later on. We believe that prevention of blindness can be effective only as the knowledge of eye care and the causes of blindness become common information to the man on the street and the neighbor in the next block.

We have been able in the past two years only to feel our way along in this educational program, but we have some definite plans for the coming biennium. Our "Cause of Blindness Study" which was published this past month has shown us what must be done in order that our efforts will really make inroads into this problem. A campaign is being waged on a nationwide scale regarding adequate treatment for syphilitic conditions and intelligent understanding of that disease. Much has been done nationally about ophthalmia neonatorum, and this is now taking up momentum in our state.

In looking at our causes of blindness broken down chronologically we find that there is much to be done in that group beginning at the "dangerous age of forty." In analyzing our blind we find that one per cent of our people over sixty years of age in this state are considered blind people and that from the age of forty the percentage of persons who are blind increases year by year entirely too rapidly. We have no reason to doubt the statement which has been made by national groups that 75 per cent of blindness is preventable, so there is a real task before us in education that can reach this group of people in middle life so they will not join the 1 per cent of persons at sixty years of age who are blind. We feel these facts show a special responsibility to this group. We plan to attack this

during the next year through an effort to reach the children, and to determine how far they can go in educating their parents, using such groups as the boy scouts, girl scouts, and other organized groups of children.

Educating the Young in Eye Hygiene

A speakers' bureau made up largely of eye physicians who will talk to the children about eye conditions in mature life and urge them to be conscious of the need of their parents protecting their eyesight is perhaps a unique way to approach this problem. For years we have all talked to parents about the care of their children. Why not talk to children about the eye care of their parents?

It may be effective if, when mama and papa get irritable, after they have read awhile in the evening, or if they complain of severe headaches or any of numerous other symptoms, that little Johnnie realizes the situation well enough because of what he has heard discussed by the eye physician at his boy scout meeting to suggest to them that they see an eye physician. He will realize there is undoubtedly something wrong with their eyes and that they should not neglect them; that glaucoma is largely a disease of middle life and if taken care of right away it need not be a serious eye condition; that the majority of people need reading glasses, since presbyopia is a very natural result of middle years and reading glasses handle the situation very nicely. It will not only help papa and mama, but it will help Mary and Johnnie to know these facts, and, as it becomes a part of their knowledge and thinking, they will be more careful of their eyes when they come to this same period in life.

You say that is looking a long way into the future, but from our short and intensive experience in prevention of blindness we realize it is going to take not only this generation, but the next, before we can see results which are at all satisfying.

Sight Restoration

Statistics show that almost one-third of blindness today in the State of Washington is caused by cataracts. Surgery for persons who could not afford the services of a private physician has not been available except in the larger centers, so during the past two years

we have found it necessary to do a fairly extensive program in cataract surgery. It is hoped that through this demonstration there will be a consciousness of the fact that a cataract does not mean that a person need think of himself as blind, but that it is a temporary condition. Today with our modern eye surgery, the removal of cataracts is rather simple, and the blind persons who have been given their eyesight during these past two years should in themselves be an education to other people in their community. Thus, we feel that our surgery and treatment has, and will, play a real part in education of prevention of blindness.

Fifteen minutes isn't long to tell you how a Social Security Department feels about prevention of blindness, but when you, who have been conducting programs for prevention of blindness over a period of years, asked a representative from the State of Washington to discuss this it surely meant that you were interested to hear from a department that is comparatively new in this work of prevention of blindness. This I have tried to do in the brief summary of how we looked at the program in our state.

Prevention of Blindness as Seen by an Interdepartmental Council*

Harry O. Page

AN evaluation of state agencies indicates the possibilities for a state program through co-ordination of its health, education and welfare departments.

Introduction

The extensiveness with which the subject of prevention of blindness through the work of public and private agencies has been covered by the previous speakers requires that I confine myself very specifically to presenting the viewpoint of an interdepartmental council on this subject. The value of combining the efforts of the major public agencies involved in attempting to correct eye conditions lies outside the realm of argument. Just as agencies engaged in administering general relief programs today are being forced by fiscal situations to integrate the various categories of assistance and service, so must the agencies involved in sight conservation pool their efforts if maximum benefits are to be obtained.

Those of us who are working from day to day in the field of welfare know all too well that many of the ills with which people are afflicted might have been avoided had the cause of the individual's difficulty received treatment in its early stages of development. Those of us who are concerned with the saving of sight appreciate as keenly as any other group the necessity for early medical attention in situations involving a person's vision. Although medical science has but scratched the surface in its study of eye conditions, there is available a vast body of knowledge which has been assimilated by skilled physicians who stand ready and are prepared to

* Presented at the National Conference of Social Work, Buffalo, New York, on the program of the Committee on Prevention and Social Treatment of Blindness, June 19, 1939.

prevent many from losing their sight. The major question which confronts society is how to ferret out those individuals who have eye conditions which if not treated will cause them to become blind. A further question of major importance is how to get a large majority of the people to recognize the value of establishing simple safeguards for the conservation of sight.

Within the state government there are three departments whose reason for being presents them with the privilege of occupying a front line in a prevention of blindness battle. These are the health, education, and welfare departments. Through the public health nurses, school nurses, and social workers, all classes of people may be reached in every section of a state. If it can be accepted that education on the preservation of sight is a very foundation stone in a prevention of blindness program, then state education, health, and welfare departments have an opportunity unparalleled elsewhere in government for carrying the principles of eye care and treatment to all of the people.

Integration of State Program for Saving Sight

Any department head seeking an adventure in contentment should not set out upon a program designed to integrate the prevention of blindness services carried on by other departments with his own, for uneasy lies the head that carries the responsibility. His restlessness will not be due to a lack of agreement on objectives between him and his fellow-executives but rather because of their impatience with the rate of speed at which progress is made.

In New Hampshire we have had an interdepartmental committee on sight conservation for approximately one year and a half. The committee consists of the heads of the state education, health, and welfare departments. Prior to our first meeting we found no difficulty in agreeing that there was much to be gained through the coordination of the sight conservation services being offered by our individual departments. The scope of each department's work along prevention of blindness lines was unknown to the other and we were unanimous in our opinion that a first step toward our objective was to reduce to paper the service being carried on by each department. As the venture was a "first time" for each of us, we likewise were unanimous in our belief that much could be gained

through early guidance from representatives of national organizations concerned with the prevention of blindness. To our first meeting, therefore, we invited representatives from the National Society for the Prevention of Blindness, the United States Public Health Service, and the Social Security Board. The first session consumed two full days and by the end of the second day each of the three department heads had placed in the record a recital of his department's work in the prevention of blindness. A study of the results was most revealing, not only because of the uncovering of the wide range of service being offered on a statewide basis by the three agencies, but because it could be clearly seen that there were great opportunities for a progressive prevention of blindness program once the services of the three departments were integrated.

Department of Education

What were some of the findings and where did they indicate interdepartmental co-operation might go in preventing blindness? Well, in the first place, we found that through the education department the needs of school children could be uncovered through an annual medical inspection and that we might expect an individual examination of the sight and hearing of public school children by both the teacher and the school nurse and an examination of vision alone by a competent ophthalmologist. In the cases of children found with eye conditions we learned that a contact with the homes could be made by the school nurse who would also follow-up on all cases, and that remedial service might be provided through co-operation with voluntary agencies and, in certain cases, through co-operation with the department of public welfare. The general direction of these health measures taken to promote better sight among school children would be guided by a supervisor of health attached to the education department. We found that the education department is in a position, also, to supervise the visual sanitation of school buildings through advice to local school boards on the lack of existing facilities, as well as through advice in connection with the preparation of plans for new school buildings and for remodeling jobs. The education department is able to establish lighting standards for all schools and to urge the purchase of light measuring equipment. It has an opportunity, also, to aid a preven-

tion of blindness program by supervising the purchase of suitable school equipment such as books, paper, etc. We found that through its vocational rehabilitation division the education department is prepared to give training and instruction to all visually handicapped between the ages of 16 and 45 years, and that through special classes provision might be made for partially sighted children. We discussed favorably the advisability of giving instruction on visual hygiene to normal school students so that within a short period of time there would be in all elementary schools within the state teachers who were aware of common eye defects.

Health Department

The state health department was found to be carrying on a quite extensive prevention of blindness program. For the prevention of ophthalmia neonatorum we learned that there is a statutory provision requiring prophylactic treatment and that the health department already provides physicians with the necessary silver nitrate solution. It is required that all physicians report the effectiveness of the treatment in all cases and the health department initiates hospitalization for all cases requiring aid. Through its hygiene laboratory the health department makes free blood tests not only for those who seek to meet the state's mandatory premarital examination requirement, but also in cases of pregnancy referred by maternity clinics and private citizens. Free blood tests are made, also, in cases suspected of syphilis. The health department is prepared to give nutrition advice as it relates to vision in cases of pregnancy, as well as cases involving infants and children. We found that in the preschool clinics a routine vision test might be included. People with serious eye conditions were found to come to the attention of the health department through its work on the control of communicable diseases. Through syphilis clinics and through clinics for the prevention of diphtheria as well as treatment of the disease, eye conditions requiring immediate attention come early to the attention of the health department officials. We found that a general survey of industrial hazards was already in progress and that a continuing program which included measures designed to prevent eye injuries had already been planned. We learned, also that a consultation service on such matters was already being pro-

vided by the state bureau of labor. We discovered that the health department established and enforced simple sanitary regulations, such as prohibiting the use of roller towels in places frequented by the public. Through county and state medical meetings and through meetings with nurses, we found that the health department was prepared to further public health education among professional people and that through its publication of the *New Hampshire Health News* it could get pertinent information to the lay public.

Welfare Department

The welfare department was found to have many opportunities for furthering a co-ordinated prevention of blindness program. Its established assistance program of aid to the blind gives it an opportunity for eye examinations by ophthalmologists with a review of individual medical findings by a consulting medical advisory board, and an opportunity to provide treatment when such is recommended. A statutory requirement that the welfare department maintain a register of all known blind provides the means for an analysis of the causes of sight deficiency. We found, also, that the welfare department could develop channels for, and might secure the provision of, medical and surgical care and corrective devices when such were needed in indigent cases. The department was found prepared, also, to provide case work services in all situations requiring such aid.

Voluntary Agencies

In discussing the means whereby interest in a prevention of blindness program might be furthered throughout the state we were amazed at the ease with which a roster of potentially helpful organizations was compiled. We agreed that invitations to associate membership on the interdepartmental committee should be sent to the private association for the blind, the state medical society, the ophthalmological society, the federation of women's clubs, the congress of parents and teachers, the American Legion, business and professional women's clubs, league of women voters, state conference of social work, state graduate nurses association, the state motor vehicle department, state tuberculosis association,

the private society for crippled children, the children's aid and protective society and the state grange and farm bureau.

As a direct result of the co-ordination of the prevention of blindness services of these three state departments, we found an immediate need for a Medical Advisory Committee on eye conditions. Such a committee of ophthalmologists was invited to meet with us and within a few days has been officially approved by the House of Delegates of the State Medical Society. This committee shares with us the high hopes which we hold for real progress in preventing blindness.

Out of an interdepartmental committee, such as has been established, there will pour a mass of valuable statistical information which, when classified and analyzed, will provide a sound basis for planning a prevention of blindness program in future days.

State Study of Causes of Blindness

A recent survey of physicians' reports of eye examinations of New Hampshire blind aid recipients and representing approximately one-half of the known blind in the state has brought to light some interesting facts relative to our program. The classification of the causes of blindness described on these reports revealed the need for more complete reports from the examining ophthalmologists. For instance, the reports studied showed that infections were the etiologic or underlying cause factor in 16 per cent of the cases reviewed whereas infections were responsible for 24 per cent of the blindness in cases reviewed in six other states. Of the 16 per cent blind because of infections, 4 per cent were due to syphilis; 2 per cent to ophthalmia neonatorum; and 10 per cent not specified. The average percentage breakdown of the 24 per cent in the other six states was 8 per cent due to syphilis; 4 per cent, ophthalmia neonatorum; 9 per cent, not specified; and 3 per cent, trachoma. The high rate of blindness due to syphilis is disturbing, yet the state health department informs us that, on the basis of premarital applications received, the extent of syphilis in New Hampshire is no greater than the proportion of positive Wassermanns in other states.

Furthermore, of cases analyzed, accidents were shown as the underlying cause of blindness in 13 per cent of the cases as compared

to a 14 per cent average in the other six states. A further revealing comparison of percentages indicated that in 53 per cent of the New Hampshire cases studied the etiology was unknown whereas the average percentage in the other states was 45.

As a result of this simple study of causes of blindness, we have learned that we must have more complete reports on eye examinations and that Wassermanns should be taken routinely when eye examinations are made. A further result of the study has been an awareness on the part of the interdepartmental committee of how little we really know about the causes of blindness and how much a carefully planned prevention of blindness program can mean.

Summary

As you have undoubtedly observed, this brief résumé of a prevention program as seen by an interdepartmental council is for the most part a recital of a method of organization within state departments as well as a recital of the potential forces which may be put to work on a single cause through the integration and furthering of existing services. We hold no brief for what has been done in New Hampshire for the prevention of blindness but we are convinced that through a pooling of our resources we shall very shortly be able to launch a prevention program which will not only materially reduce the number of persons becoming sightless annually in our state but will through emphasis and education for better care of the eyes, preserve for great numbers of our people one of their priceless heritages, their sight.

A Medical Social Case Work Approach to the Development of an Eye Health Program*

Muriel Gayford

THE author presents some aspects of an eye health program as it affects the individual.

WHEN we speak of developing a program for maintaining eye health, we have already made it possible to start on our way with constructive thinking and planning. There is emphasis on maintenance of healthy functioning and on prevention of disease. As such programs are established and are tested experimentally, an aspect which deserves particular consideration is that of understanding the ways in which the program actually touches the people for whom it is organized and of studying the effect on them of its activities.

Purposes of an Eye Health Program

Before exploring further the specific problem of how an eye health program affects the individuals concerned, it might be well to review briefly and very generally its purposes and activities. We must begin first with a recognition of the social and individual value of eyesight and accept as our ultimate purpose its preservation to a maximum extent. The term "eye health" must be used in its broadest meaning, aiming not only for visual organs that can function, but also for such functioning as can be used by the individual in co-ordination with his other senses. When handicapping ocular defects occur, we are as concerned with the individual's capacity to adjust to his limitations as we are with restoration of as much visual power as possible. To this end we should concentrate our

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efforts on a three-fold program: (1) prevention of eye diseases and visual defects; (2) treatment of existing conditions so that there is a minimum handicap; and (3) rehabilitation of affected persons so that there is a maximum use of the remaining function. The 1930 *White House Conference on Child Health and Protection** has given us an excellent outline of points which should be included in a plan to further this purpose. These points include: provisions for early discovery and diagnosis; curative and remedial treatment; education to develop latent abilities; vocational adjustment; protective legislation; research into the causes of visual difficulties and methods of prevention and control; and a comprehensive plan of cooperation among local, state and national agencies, educational, vocational, industrial, welfare and health.

We know that for our purposes a general eye health program would be concerned with adults as well as with children, but there seems to be no need to add further activities to the above suggestions. They could be broadened to include provisions for all ages. Finally, there is another set of factors in regard to this whole problem which I would like to mention briefly. They have to do with the means of providing for an eye health program and making it possible to function. Financing, administration, enabling legislation and its enforcement must be worked out in practical detail if the program is to have any reality.

Recognition of Individual Differences

I have spoken of the importance of being aware of the ways in which a program for eye health touches the lives and feelings of the individuals for whom it is functioning. What is meant by this? It seems to me that it indicates primarily a need to keep in proper perspective the individual we plan to benefit, understanding him as a person, old or young, with a cultural heritage, social attitudes, emotional needs, physical and intellectual strivings, which he alone can fit into some living whole. He may need protection, stimulation, assistance, perhaps some regulation, in one or more areas of his life, but if he is to become an organic part of a social group his individuality must be respected. This individuality does exist, al-

* *White House Conference on Child Health and Protection*, Section IV, "The Handicapped, Prevention, Maintenance, Protection," pp. 5–6.

though within the basic tendencies common to all human behavior, as psychology and science are revealing them to us, it is difficult to comprehend the infinite varieties of conduct which may result. We are willing to accept as a fact that among the millions of people who exist there are no two who look exactly alike as to detail, although the general body build is the same. We must recognize that man's personality develops as uniquely, and cannot be made to conform to a selected mould.

Any program for social welfare must somehow take these variations into account, respect them, and make provision for emotional as well as physical development. Otherwise its facilities not only will not, but cannot, be used. A case which has, so far at least, failed to make a satisfactory social adjustment may serve as an illustration. I use the word "failed" because the individual is unable to face the realities of his situation and is not developing the capacities which he has.

The Story of Clyde

Clyde is eighteen years old, about to enter his senior year in high school. As a small child he was blind because of congenital cataracts. His father also had congenital cataracts and is now classed as industrially blind. Medical care with good results was eventually made available for Clyde. He has been educated throughout in sight-saving classes. He has had the use of the recreational facilities of an organization for persons with visual defects. He has recently had a complete vocational study. The results would indicate, however, that Clyde has used none of these advantages as well as he should. He is afraid of having to have another operation on his eyes and therefore will not report to the ophthalmologist for periodic examinations. Of course he wears his glasses but has never learned to use them properly and surreptitiously does his reading with the aid of a magnifying glass. His school grades are average, but he has never made a satisfactory place for himself in the social life of the school. He cannot accept any of the vocational possibilities suggested to him, but has visionary plans of going on to college in spite of only average intellectual capacity, and the absence of all financial resources within the family for such a project. He has fairly adequate vision now, but he has evidently carried over many mannerisms from his blind childhood. His posture is poor and he is awkward in

carriage and in movement. He is physically timid. He constantly expects special attention to be given him. He is often suspicious and jealous of others. Above all, he is unhappy and miserably unsure of himself as he faces the prospects of having to finish school and make his own way. Because he cannot admit his own limitations, he must find release in fanciful day dreams and fails to make use of the abilities which he has.

We cannot now be sure that we can put a finger on the original difficulties in Clyde's situation—the cause of the breakdown of the social plan for his maximum development. It seems likely, however, that help for his parents when they were first faced with this handicapped child, and more emphasis on Clyde's emotional adjustment during his preschool and grade school years, would have helped. More considerate and understanding discussions of his medical care, earlier vocational study with its accompanying encouragement and stimulation, more contact with normal children, and as much emphasis on social development as on school subjects, might have set Clyde on a different path.

Need for Psychiatric and Case Work Help

What can we learn from Clyde's situation that will help us in planning the development of an effective eye health program? Do his problems have significance for us in relation to all those persons for whom an eye health program is organized? We see that, for the most part, community facilities were ready for him but he did not use them to the extent of gaining fully from them. The fault, therefore, must have lain in the fact that the facilities available were not appropriate for his own particular combination of needs. Do we know why and at what points there was failure to obtain a real contact between Clyde and the organizations the community had set up for him? Probably when Clyde was born, not a great deal was known about these matters and even now we cannot answer this question clearly. The lack of sufficient usable knowledge about the general needs of any child in such a situation and how to provide for them is one of the frequent difficulties in medical social work which should be stressed here.

Clyde's history began eighteen years ago. We now know very little of what that early history was, except for the fact that he had

a father similarly handicapped and that he was called "blind" by his family. As Clyde has developed, however, he has given us indications of the struggles and conflicts he faced, because he has never fully solved them and we still see evidences of them. His physical timidity, poor muscular co-ordination, egocentricity, blaming others for his difficulties, inability to face and accept responsibility, indicate very generally the physical, psychological, and emotional problems which are part of the life situation of any child who is blind during his most important formative years.

We shall have to leave research into such problems to the specialists in psychology and psychiatry, but we can admit our need for their help, and we can hold ourselves ready to use the advice and information they can give us. Study of this whole subject is of vast importance to the foundations and intent of our programs. It should of course be broader than an inquiry into the psychological life of the blind child, although that perhaps is a starting point. If we are alert, a study of the meaning of blindness for the small child can give us additional awareness of the difficulties attendant upon loss in later years of this precious sense, and can help us to see the implications of threatened or actual trouble of any kind with the organs of sight. In addition, we need to know more about how the normal person, child or adult, uses his eyes for perception of the outer world and as a means of expression of inner strivings, before we can understand the compensations and compromises which are a necessary part of the adjustment to their impaired functioning.

The point that I would like to emphasize is that the organizations which a community sets up to benefit its members are used by individuals only as they feel a need for them, and only as the community's facilities will meet that need. It is attendant upon us to know what those needs are, so that we can present our efforts to the public in a usable form. It is common knowledge that any worker must adapt his methods to the material with which he is working. We who are interested in social welfare are working with human beings and we are also working for them. Even if we would, we cannot make them over into something other than they are. We can only release their energies and give them opportunity to develop into self-functioning, mature individuals, adjusted to their social groups. Any specialized help that they need in order to ac-

complish this development should be available to them. Just as provision of medical treatment alone, without a sight-saving class, is not sufficient if a child is in need of protection from close use of his eyes, so the addition of a sight-saving class alone is not sufficient if the child cannot, by himself, or with the help of his family, achieve emotional maturity.

We find then that our first problem in a study of the ways in which a program for eye health affects the persons who are to make use of it has to do with an understanding of these persons as individuals, an application of all we can learn about human behavior and personality in general, and a plan for further research into the psychological needs of the visually handicapped. A preliminary consideration of these needs for building a program has already revealed for us two objectives which we should keep in mind: namely, specialized psychiatric and case work help, where the problems for the individual are too acute to be adequately worked out through the general use of community resources; and an adaptability and flexibility in the functioning of the resources as they are set up so that they can be used individually.

A simple example of how such increased understanding can help a patient to obtain needed medical care and to proceed on a constructive plan for his future return to a more normal life may make this situation more clear.

The Story of Frank P.

> Frank P. is a Negro in his thirties who previously worked steadily at various semi-skilled jobs, but who within the past year has been very inactive because of total blindness. He had had one eye enucleated several years ago following an accident. In the spring of 1938 he had uveitis in the other eye which eventually cleared, but secondary glaucoma and a cataract developed. Medical treatment moved along fairly smoothly for a time and two operations were performed on the eye, one to relieve the glaucoma and the other to extract the cataract. Then, unexpectedly, following the second operation, Mr. P. did not report to the clinic for several weeks either for examinations by the oculist or to consider another operation which had been advised. His vision at this time was only hand motion. When the social worker discussed this situation with him, the seemingly absurd inconsistency between his fear of

> permanent blindness and his refusal to return to the hospital for the needling of a cataractous membrane was understood in terms of the meaning of threatened blindness to anyone and of the psychological mechanism which we all use to escape from a situation which we cannot face. As long as Mr. P. did not have this third operation, the prognosis for which was unknown in view of his old uveitis, he could pretend that his blindness was only temporary and at some time he might do something about it. But, as he thought, what if he should have the operation now? He felt that he would do anything to regain his eyesight, but his two previous operations, which did not improve his vision in spite of his hopes and prayers, were still too recent and had been too bitterly disappointing. He could not, by himself, plan for and undertake the final operation because he knew that if it failed all hope was gone. Mr. P. had been married but was separated from his wife and had no children. He lived with a sister who was about his own age and who was also separated from her husband. There were thus only the two of them in the family and they had moved together to a northern city from a southern state many years before. Mr. P. was entirely dependent upon his sister when his eyesight failed. The sister was devoted to him but, because of poor general health and nervous excitability, was of little real assistance to him. She was more afraid of the advised operation than was Mr. P. himself. She had been unable to help him think out constructive ways to meet his everyday problems—how to learn to feed himself, how to shave, how to gain enough confidence to go about by himself.

The social worker from Mr. P.'s clinic, therefore, found a man in a state of confusion as to what he wanted to do for himself and having no one to whom he could take his problems for a helpful discussion. By being interested, giving the information asked for, and being the friend to stand by and give support when Mr. P. was afraid to go on alone, the social worker made it possible for him to feel he could try to carry out plans. Mr. P. had the third operation as soon as his eye was ready for it. Only partial vision has been restored but he will soon be prepared for the next step in his care—that of re-training in some occupation where he can use the vision which he now has. It was not necessary for the social worker to "persuade" this man to have an operation or to "talk him into co-operating" with the clinic. It was not even necessary to explain

to him the many factors in the situation which the social worker saw. All that was required was someone to understand his psychological need in relation to the acute medical problem he was facing, and to give him sufficient interest and help so that he could be freed from his paralyzing fears and could proceed to help himself.

Consideration of Social Attitudes

The case of Frank P. and that of Clyde may serve to illustrate another point which we must keep in mind in considering this entire problem. It has to do with the importance of understanding the social background of our patients' attitudes toward their visual difficulties. Clyde, as a small child, was so limited by his physical handicap that he was unable to develop independent habits of thought and constructive reactions toward his environment as he grew through boyhood, even though a great part of his vision had been restored. Mr. P. had such a fear of permanent blindness that he was unable to act decisively to avert it. Where did these two individuals find these reactions which determined the form of their behavior? It seems likely that Clyde was reflecting the hopeless, confused feelings of his parents toward his condition, and was fighting as best he could against their failure to accept him as a lovable, worthwhile child. We know that Mr. P. was conditioned by a horror of the dependence of blindness which he had before he was ever actually threatened with it, and that his sister increased his difficulties because she was so overcome that she could not bear to let him discuss the very things which were such a burden to him.

The feelings of each of these individuals arose within themselves largely to meet the attitudes of others with whom they were coming in contact, and these attitudes of parents and relatives were again conditioned by society as a whole. In view of the fact of the human being's great power to compensate for limited functioning in one direction by developing greater power to use latent abilities in other directions, there is always a question as to what extent the handicap of a physical defect is due to actual limitation of function and to what extent it is due to the attitudes of others. Freedom to develop compensating activities, and encouragement to grow with help which increases independence and individuality is the atmosphere which we should aim to create. It is important to

keep in mind that expressions of social attitudes are everywhere about us and have influence in conditioning not only the use made of facilities for medical care, but also the understanding and support of preventive programs.

It is not possible here to go into an analysis of social attitudes toward problems of vision, where they come from, and what purpose they serve. This is another subject which will have to be left to experts for further exploration. Dr. Abram Kardiner* has discussed security, dependence, and hostility in our present culture, and indicated the problems to be met in such a study, and the direction it should take. He said as part of his introduction:

> "A social psychology must be a preparation for action; it must interpret the effects of institutions on human nature and must track down those human needs the institutions were meant to serve; it must show us the way to track down the forces concealed in institutions, forces we cannot identify, forces of which we feel the effects but know neither the source nor the purpose."

This would be an ambitious undertaking, but, I am sure, would give us greatly increased understanding of the direction our plans for organization should take. In the meantime, however, since we are all involved in immediate action of one sort or another, it may be well to remember to use what knowledge we now have of the group feelings and beliefs which we find about us. There has been a reason for the growth and persistence of these underlying social reactions and there is no necessity to think that we should change them overnight if we could. They are frequently very realistic and practical, and represent what there was of value which could be passed on to us from the experience of generations back. We all carry with us some conception of the importance our culture places on the functioning of the eyes, although we may not be able to express it very clearly and may take it a good deal for granted.

Public Education in an Eye Health Program

In our everyday language, the words "to see" and "to understand" are almost interchangeable because society has recognized

* Kardiner, Abram, M.D., "Security, Cultural Restraints, Intrasocial Dependences, and Hostilities," *The Family*, October, 1937, p. 183.

the extent to which knowledge of a thing or a situation comes from observing it at first hand with the eyes. Fear in regard to injury of the eyes is very strong in any culture. I know of no handicapping condition which calls forth such an intense and immediate emotional response from the public as does the threat of blindness. This situation is fortunate for us here as it can be a source of strength, but it also has great dangers. It can be a strength because, as an emotional reaction, it has power behind it; power to act, to get things done, to raise money, to provide medical care. Its dangers lie in the fact that this force needs organization and control if it is to be expended constructively. Education of the public as to what can be done to prevent eye defects, how the status of the visually handicapped can be improved, and demonstration of effective programs will do much to overcome the tendency toward horror, fear, pity and hopelessness that may otherwise flourish.

This subject of social attitudes is of double significance for those of us who are interested in working with programs for prevention or treatment of eye difficulties. They furnish the setting in which any program functions and they strongly condition the reactions of those individuals who will make use of it. In addition, we who work directly with these individuals have grown up in this same culture and have absorbed the same general reactions of our social groups. We cannot too often stop to examine our own attitudes and to understand and control our own feelings about these problems with which we work. We probably are not overcome by fear and pity to the point of having to turn away from the menace which we see in certain social situations. We are too much in the midst of activity to be able to turn away completely but we can still ask ourselves if we are facing facts squarely and therefore engaging only in complete and constructive policies. We must have an ideal before us which admits limitations but which builds on strengths. We must utilize our concern for others to protect them and our interest in them to help them, but we can have no use for a fear which separates us from the person to be served, a pity which smothers him with useless activities, or a desire for dominance which takes away all his independence. We ourselves, as we work in eye health programs, are certainly most numerous

and important points of contact with the individuals being served and our attitudes and behavior will have a direct effect upon them.

Summary

I have touched on a few of the important points we must keep in mind in considering what meaning a program for eye health has for those individuals for whom it is organized and the ways in which it might be used by them. I have, for the most part, only indicated where our problems are and how we may prepare ourselves to meet them through further study and research. In conclusion, I should like to enumerate certain objectives which, in view of the above discussion, we may be able to accept as basic to any program which is to emphasize the total social welfare.

1. We should plan for a program which is based on a realistic knowledge of the situation. We must, therefore, require continuing study of how the program is working, and opportunities for meeting the needs of society as they change or as our knowledge of them improves. At the present time, two points of particular emphasis for research might be: first, the effect on personality development of visual defects; and, second, the relation between social attitudes and the needs which we are attempting to meet.

2. We should constantly re-examine our own attitudes toward problems of sight conservation and blindness, realizing that the adjustment a handicapped person makes is largely his response to the reaction of others to his condition, and that even the use made of medical services to prevent a handicap may be conditioned by a reflection of the fear or hopeless resignation in the social group. When our own attitudes are understood and controlled constructively we are prepared to educate the public to participate in activities which can be soundly concrete as well as being idealistic.

3. We must provide for flexibility in the functioning of the program because we realize that we are dealing with human beings who do not respond to regimentation. We should make use of our respect for individual differences and allow the maximum possible provision for them within the necessary rules and regulations governing any public welfare program. Facilities for dealing with specialized and individual problems must be available.

4. And finally, we must learn to help our people, to use all other

types of available community resources as they are needed, so that there is a well integrated plan for their physical and social growth. This means a very real acceptance of the fact that we should be concerned with the whole person, not just with his eyes, and that we are interested in that person's vision only as it can be used by him in a free and developing social life.

Development of a Prevention of Blindness Program from the Standpoint of an Ophthalmologist*

Harry S. Gradle, M.D.

DR. GRADLE describes the organization of the Illinois Society for the Prevention of Blindness, of which he is Vice-President, and indicates the relationship of the ophthalmologist to this kind of organization.

AS OPHTHALMOLOGISTS we naturally are infinitely more interested in the prevention of blindness than we are in the care of those already blind. Our interest is, of course, somewhat centered in the technical aspects of the work, and whatever suggestions we may have to offer are based upon that phase.

In any medical problem that presents itself the first thought of the scientific worker is, "What is the cause?" That thought we ophthalmologists naturally carry over into preventive work and our first question in the development of a program is, "What are the causes of the blindness that is prevalent in the area in question?" Unfortunately, the national census figures are too incomplete and too vague to be of great value. It is hoped that the next census, which promises to be conducted in a more scientific manner, will yield more information as to the number of blind and the causes of blindness in the United States. An analysis of the blind pension rolls in the different states is entirely inadequate because, in the first place, the definition of blindness varies with the different localities; in the second place, the diagnoses are seldom made by ophthalmologists; and in the third place, only a variable percent-

* Presented at the National Conference of Social Work, Buffalo, New York, at the joint session of the Committee on Prevention and Social Treatment of Blindness with the American Association of Medical Social Workers, June 22, 1939, and published in the Proceedings of the National Conference of Social Work.

age of the blind in any one state are on the pension rolls. The answer to these questions is, of course, simple—namely, a medical survey of the blind of any given locality in order to determine what causes the blindness. Such is the first reaction of any ophthalmologist to the development of a prevention of blindness program. This is entirely logical for, unless the causes of a condition are known, it is futile to endeavor to control future developments of that condition.

The next question that comes to the mind of the ophthalmologist is the scope of the work to be accomplished by whatever organization may undertake work in the prevention of blindness. Effective work may be done in a community by some efficient organization. But unless that community happens to be a community of fairly large size the result will be a mere "drop in the bucket" and cannot be worth the time, effort, and money expended. On the other hand, blindness varies so in different states of the Union that a national program cannot be broad enough to delve into the prevention of blindness in the various localities. Thus, for example, in one part of the Union there is great loss of sight from neglect among coal miners; whereas in another state, industrial injuries are a major factor; and in a third state, trachoma plays a great rôle. Consequently, from a national standpoint, there cannot be any uniform program for prevention of blindness. So the logical answer seems to lie in the development of state organizations for the prevention of blindness, banded loosely together under the aegis of the National Society for the Prevention of Blindness. Organizations smaller than statewide societies are too small and too impotent to wield the necessary influence, either in publicity or legislative matters.

So the ideal set-up for nationwide prevention of blindness work would be individual state organizations. Each organization should be an entity. Inasmuch as each state organization would have its own individual problems to deal with, each organization should be financed locally, but should be subsidiary to the national organization. This latter must act as a clearinghouse, as a source of education, and as a parent to educate and train effective workers for the state organizations.

I have been speaking of lay organizations in prevention of blind-

ness work. I believe that they are preferable to governmental agencies, because they are independent of politics and not subject to changes in administration. They are not tied by red tape, nor hampered by other governmental bureaus. But they must not set themselves too high, as their work must be with governmental agencies—federal, state, and local. As Howard Vincent O'Brien has so aptly put it, "The state prevention of blindness society is the spark plug which activates the existing governmental agencies into caring for a situation." The state society neither can, nor should, try to raise funds of sufficient size to correct existing situations that may lead to blindness, but the state society should investigate such conditions and obtain all possible information. It should then propose a plan for the correction of such conditions, a plan that will gear into the existing government agencies and is feasible without excessive expenditures of state or federal money. If necessary, the society may inaugurate that plan as a demonstration project, but always with the thought in mind that when proven feasible, the future operation should be put into the hands of a governmental agency. The state society should be prepared to present all this to the legislature of the state and when convinced of the soundness of the plan be prepared to lobby for such necessary legislation. All possible avenues of publicity should be utilized by the society on the projects that they develop, since this will result in a sounder education of the public.

As to the make-up of a state organization, it must be dominated by civic-minded citizens of recognized ability. Of course ophthalmologists must participate actively in the technical direction of the work, but as the late Dr. Wilder pointed out, all executive ophthalmological participation must be behind the scenes and not directly before the public. The keynote of a well-functioning state society for the prevention of blindness is an efficient executive secretary. This must be a medically trained, well-rounded social worker with ability to contact all strata and to participate actively in obtaining necessary legislation. That secretary must be given adequate office help, capable of assuming the necessary mechanical work.

In Illinois, thanks to the foresight of the late Dr. Wilder who founded the Illinois Society for the Prevention of Blindness and laid out the course of its activities for many years to come, we have

found that the organization, such as I have sketched it above, has worked efficiently; and I feel that the development of a prevention of blindness program from the standpoint of an ophthalmologist can best be described by discussing at some length the work of that society.

We have certain definite lines along which the work has been conducted and, if it has progressed as expected, it has then been turned over to a governmental agency.

One of the major accomplishments of the Society was to obtain the passage of a bill enforcing the use of silver nitrate, or a satisfactory equivalent, in the eyes of newborn children at birth. It took many years, much publicity and an enormous amount of hard work to obtain the passage of that bill. In fact it was vetoed by one governor, but his successor was a man of greater vision. Since the passage of that bill six years ago the Illinois Society has checked the records of all births that have occurred in Illinois. Wherever a notation has occurred that a physician or midwife had failed to use the prophylaxis or even had failed to record its use, the authorities at the state capitol have been notified for disciplinary measures. As a result in the years 1937 and 1938, when there were 230,000 births in the state of Illinois, there were only 90 cases of ophthalmia neonatorum reported and not a single eye was lost from this dread disease.

Of even greater magnitude was the development of the sight-saving classes. Such classes are a phase of the advances of recent years and it is still too early to evaluate the good that results. We ophthalmologists believe that sight-saving classes play an enormous rôle in the prevention of blindness, but as yet have no statistical proof to offer. Our belief, based upon the observations of many years, is sufficiently strong so that we are wholeheartedly behind the question of sight-saving classes. But no board of education will introduce a sight-saving class unless the need for such a class has been shown. And there is no provision in any state for a visual survey to show such needs. Consequently, we believe that such surveys are directly a function of the state prevention of blindness society. And we in Illinois have pursued our belief. Throughout the entire state the nurses of the prevention of blindness society are making a continuous survey of the vision of the

school children in communities large enough to justify a sight-saving class. There should be ten or more children eligible. When that number is found, the matter is taken up with the state educational authorities and the Society works hand-in-glove with them on the establishing of a sight-saving class and the transportation of children from the neighborhood schools to such a class. The Society has a very definite word to say in the training of the teachers, in the character of the equipment and the specifications for the books that are used. Not only the state but the local boards of education have come to lean upon the technical advice of the Illinois Society for the Prevention of Blindness in the development and management of the sight-saving classes. The enabling act under which these classes operate was written and nursed through the legislative labyrinths by the Society. The appropriations necessary for this rapidly expanding program are approved every biennium by the legislature after educational lobbying by the Society. But the work does not stop there, for a further educational program is carried on every summer in the form of an institute for public health nurses. These very necessary workers are there trained in the technique of how to discover serious visual defects and where to direct the children to proper remedial quarters. Two hundred and sixty school nurses from all over the state have been trained in these institutes, and the results are showing. As a consequence of all this work, we now have 81 sight-saving classes in Illinois, contrasted with the 10 that were in existence in 1927.

Two of the sight-saving classes were opened in the school for the blind. Under the authority of the Department of Public Welfare, three ophthalmologic members of the Illinois Society for the Prevention of Blindness conducted a survey of the eyes of the 240 children in the school for the blind. The result of the survey showed that there was great laxity in the visual requirements for admission to the school for the blind and that there was an unduly large number of sighted children being educated by blind methods. In the majority of instances, the children were in the school as a result of political influence. Again, thanks to the intelligent co-operation of the governor, a clean sweep was made through the school for the blind and all of the children with vision of better than 20/200 in the better eye were discharged. The vacancies thus left were

utilized for the development of two sight-saving classes in the school for the blind for such children as lived too far from any existing sight-saving class. We realized that the mixture of blind and sight-saving class pupils in the same buildings was far from ideal. But the place was there, the money was there, and it was thought far better to give these partially-seeing children the opportunity rather than let them endeavor to struggle for an education in the regular classes. The psychological effect has not been as bad as was anticipated and these two sight-saving classes are yielding large dividends to the children from rural localities. Without the checking and active co-operation of the Illinois Society for the Prevention of Blindness, this could not have been accomplished.

The existence of trachoma in the southern part of Illinois has been recognized for a long period of time, but nothing was done about it. Two surveys at ten-year intervals were undertaken by the Illinois Society, but led to no practical results. Shortly after Governor Horner was inaugurated in 1933, he was approached by the Society and informed of the conditions that existed. From his contingent fund for the control of communicable diseases he appropriated money to the tune of $15,000, to which $6,000 was added by the Society. And five out-patient clinics were established in the trachomatous areas. The aid of the W.P.A. was invoked and generous co-operation in the form of labor and transportation was given by the organization. The Department of Public Welfare contributed nurses, the Department of Public Health supported the project insofar as it was capable; and in the course of two years a well-established clinic service was ministering to the trachomatous sufferers in the southernmost 17 counties of Illinois. The project was managed and supervised by the Illinois Society for the Prevention of Blindness. At the end of three years, the demonstration was so effective that the entire project was taken over by the Department of Public Welfare and financed by special grants from the legislature, but it is still supervised by the Society. It might interest you to know that in the six years of operation, 3,500 cases of trachoma have been discovered and put under treatment. And the treatments are continuing at the rate of 800 a week. Inasmuch as fully 10 per cent of these trachomatous sufferers would become blind if untreated, and consequently eligible to a blind pension of a

dollar a day, it does not require a mathematician to figure out that these clinics, operating at a cost of $40,000 a year, are saving the state over $80,000 a year in blind pensions. It is also interesting to note that as a result of this joint co-operation among federal, state, and lay agencies, trachoma will be wiped out in Illinois within the next ten years.

The next activity of the Illinois Society for the Prevention of Blindness was thrust upon, rather than initiated by, the Society. Some three years ago the Chicago Board of Education obtained a grant from the W.P.A. for a visual survey of the primary schools of Chicago. The Society was requested to act as co-sponsor and to undertake the supervision of the survey. This was done with the provision that the survey would include remedial measures and not be merely another visual screening affair. W.P.A. workers were to be used. A fairly large list of intelligent, unemployed young women, were interviewed by the executive secretary of the Society. The resultant hand-picked workers were put through a course of training under adequate supervision. The survey was then started. At the end of two years 500,000 children of the primary schools of Chicago had been put through a visual screening. Defects were found in 18 per cent and these were divided into Ix, IIx and IIIx classes, according to the severity of the defect. The parents of the Ix and IIx cases were notified by the workers as to the extent of the visual defects in the children and it was recommended that they seek expert ophthalmologic attention. But the parents of the IIIx cases were visited by the workers who explained the situation. By mutual consent these children went to their private ophthalmologists, or to one of a list of 75 younger ophthalmologists who agreed to take care of these cases at a considerably lower fee than usual, or to an ophthalmic clinic. As a result, 60 per cent of the children with serious defects of the eyes have been put into the proper medical hands for the correction of such defects. The survey itself was of greater magnitude than any previous one, but far more important is the fact that the survey was merely the forerunner of the remedial program, which was on a scale far beyond anything ever previously attempted.

Without the active co-operation and supervision of the Society for the Prevention of Blindness, such a survey, with its far-reaching

remedial features, would not have been possible. The importance of this work has been recognized by the state authorities and as a result, a similar statewide project is now under way. Again, the Society was asked to co-operate and supervise. But this time the survey was to include, not only eyes, but ears as well. And to that end the Society had to invoke the aid and co-operation of the Chicago Laryngological Society and the League for the Hard of Hearing. It is probable that, when the statewide survey is finished, particularly in the sparsely populated rural districts, a nationwide program along similar lines will be instituted.

One of the major causes of blindness is that dread disease known as glaucoma, hardening of the eyeball. According to locality, 6 to 20 per cent of all known cases of blindness are due to glaucoma. In a large percentage of cases, the disease can be controlled, with resultant preservation of sight, provided the patient continues under ophthalmologic observation and treatment. But the long-drawn-out character of the condition discourages so many that they drop from sight and accept resultant blindness as inevitable. The late Dr. George Derby of Boston recognized these facts and was the first to establish in the Massachusetts Eye and Ear Infirmary a social service exclusively for the purpose of following glaucoma patients as long as they lived. It took us a good many years to follow in his footsteps, but now the rest of the ophthalmologic world is waking up to the necessity for such social service. However, the value of such a program must be demonstrated to the authorities before money will be appropriated for that purpose. Therefore, the Illinois Society for the Prevention of Blindness has instituted a special Glaucoma Social Service Department at the Illinois Eye and Ear Infirmary. This was made possible by special grants from the Sprague Foundation, the Walter P. Murphy Foundation, and the Chicago Community Trust, to cover the operation of the plan for two years. The purpose of this clinic is to see that all glaucoma patients continue under medical observation. In the last six months, while this service has been operating, we already have 300 cases under treatment and from the statistics of the past we are sure that a large percentage of these 300 would eventually have become blind if allowed to stray from medical supervision. We believe that the operation of this special department will go far toward

reducing the incidence of blindness due to glaucoma in the State of Illinois. At the end of a two-year period we are certain that the value of the project will have been so thoroughly demonstrated that the costs of further operation will be assumed by the state.

Such are the major projects upon which the Illinois Society for the Prevention of Blindness has been at work. There are numerous minor projects, such as a publicity campaign against Fourth of July accidents, a publicity campaign to institute proper treatment for cross-eyes early in life, co-operation with other social agencies in all matters that pertain either directly or indirectly to the prevention of blindness, etc. If I have seemed somewhat egotistical in what has been accomplished by the Illinois Society for the Prevention of Blindness, it is entirely a pride in the organization. As far as our knowledge and belief goes, we are endeavoring to do a definite job to the best of our capabilities. What we are trying to do has been the theme of my address: the Development of a Prevention of Blindness Program from the Standpoint of an Ophthalmologist.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

Thirty Years in Saving Sight*

It was not until thirty years ago that a group of socially minded men and women organized a popular movement in this country for the prevention of blindness and the conservation of vision. This movement, however, had its origin in the latter part of the nineteenth century, when Dr. Karl Siegmund Franz Credé demonstrated, in his maternity hospital at Leipzig, that ophthalmia neonatorum, one of the principal causes of blindness, could be prevented through the use of silver nitrate drops in the eyes of infants at birth. Unfortunately, there was a great lag between the learning of the fact and its universal application. Those of you who are familiar with the history of the National Society for the Prevention of Blindness know that it was chiefly to overcome this lag that the Society was originally founded.

Time does not permit a full account of earlier efforts, but I should like to mention the London Society for Prevention of Blindness which existed for a few years in the eighties. Despite its short life, the London Society exerted widespread influence by publishing a remarkable essay on the causes and prevention of blindness, by Dr. Ernst Fuchs, of Vienna, who became internationally known as the "dean of ophthalmologists." Dr. Fuchs had the rare satisfaction of having his ideas translated into practical measures during his lifetime. It is particularly fitting on this occasion to recall that his name is among that distinguished company to whom the Leslie Dana Medal has been awarded.

The actual beginning of the committee which developed, eventually, into the National Society for the

* Presented at the 1938 annual meeting of the National Society for the Prevention of Blindness, Inc.

Prevention of Blindness may be traced to a report made in 1907, by Dr. Park Lewis, as chairman of a special commission to investigate the condition of the blind. A brief section dealing with the possibilities for prevention said: ". . . the members of your Commission have been profoundly impressed with the fact, which has constantly forced itself on their attention, that a large part of it (blindness) was unnecessary and preventable. . . ."

In 1908, this report came to the attention of Miss Louisa Lee Schuyler, who had been an organizer and leader in public health and social work. She invited Dr. Lewis to "point the way" for her to be of service. Within a few weeks, Miss Schuyler brought together a small group which subsequently established the New York State Committee on Prevention of Blindness. In 1915, under the managing directorship of the late Edward M. Van Cleve, this became the National Committee. The name was changed to National Society for the Prevention of Blindness in 1928.

Three decades have passed since that beginning, and it is thrilling to browse among the old records which show the steady progress of the work initiated by Miss Schuyler and her colleagues. In reviewing the growth of the Society, it soon becomes evident that the activities and principles of operation have continuously followed the original philosophy of the founders. It may be of interest to analyze the Society's program in the light of the objectives set forth in the charter and by-laws:

Objective One

To endeavor to ascertain through study and investigation any causes, whether direct or indirect, which may result in blindness or impaired vision.

It has always been the policy of the Directors to interpret this purpose as study and investigation of scientific findings which have been made available through medical or other research institutions established for the particular purpose. As illustration, I may cite the following instances:

The efficacy of prophylaxis in the prevention of blindness from ophthalmia neonatorum was accepted in all medical and scientific circles. The Society's function was, therefore, to make this knowledge socially effective through public education and through the support of such legislation and board of health regulations as would aid in bringing about desired results.

Medical science has demonstrated that early treatment of the expectant mother suffering from syphilis will eliminate the possibility of transmitting the disease to the offspring, with a consequent prevention of possible blindness or serious visual impairment so often resulting from a prenatal syphilitic infection. The Society's aim is to

publicize this fact and to extend knowledge of preventive possibilities through proper medical care.

The same procedure has been followed by the Society with reference to acquainting the public with scientific knowledge relating to cataract, glaucoma, trachoma, myopia, strabismus, hereditary eye conditions, etc.

Another type of investigation which has been undertaken with this objective in view is concerned with the compilation of original data; for example, current data showing the decrease in blindness from ophthalmia neonatorum, and the increase in the establishment of sight-saving classes. Studies made through a Joint Committee on Statistics of the Blind, by indicating the relative frequency of various causes of blindness, are already showing where emphasis should be placed in preventive programs. Similar studies of causes of eye injuries and the effectiveness of safety measures have brought the problem of eye protection forcibly to the attention of the general public, as well as of specialists in the field.

Objective Two

To advocate measures which shall lead to the elimination of such causes.

From the beginning it has been realized that the Society's position in the scheme of things is one of guidance or leadership. It advocates measures, but has no facilities either for enforcing its recommendations or actually carrying them out in local communities. By demonstration, persuasion and advisory assistance in planning, it influences other agencies to carry on the necessary activities. Measures recommended by the Society have been based largely upon the three general divisions of a prevention program: the restoration of sight through medical, surgical and optical means; the treatment of diseases of the eye and of those bodily diseases which affect the eye; the provision of such environmental conditions and safeguards as will lead to the conservation of vision. In carrying out its purposes, the Society has assumed it to be sound policy to co-operate with public and private agencies in assisting them to meet certain responsibilities for eye health which lie in their own particular fields. Perhaps the outstanding example of this is in the promotion of sight-saving classes in co-operation with state and local educational departments. Time will not permit a detailed account of how this and similar co-operative relationships have been carried out.

I should like to say, though, that it has always been the policy of the Society to co-operate with agencies for the blind having prevention as a major function, and with all state and local organizations engaged directly in the prevention of blindness field; however, it has been the Society's practice to promote such

organizations only when a desire for them is manifested by the community itself. There has been no endeavor to set up nation-wide branches or chapters, and the existing state and local agencies engaged primarily in the prevention of blindness are autonomous.

Objective Three

To disseminate knowledge concerning all matters pertaining to the care and use of the eyes.

This third phase of the work of the Society, namely, the dissemination of knowledge concerning all matters pertaining to the use and care of the eyes, has been carried out through various channels, such as the preparation of slides and films; publication of THE SIGHT-SAVING REVIEW, with wide distribution of reprints; preparation of articles for pamphlets and magazines; release of news and feature material to the press; lectures and radio talks; planning of and participation in conferences and institutes; also through field service and a voluminous correspondence in answer to requests for information from every part of the United States.

Naturally, in this brief review it has been possible to give only an indication of the extent of the Society's program. Nor has time permitted more than a passing allusion to many aspects of its co-operative activities.

In its thirty years of sight-saving work, the National Society has endeavored to act as a clearinghouse for authoritative information. It has consistently sought the guidance and approval of the medical profession and of other scientific bodies in carrying out its program of making available to the laymen the results of scientific research.

With the broad programs now being undertaken by voluntary and governmental and health agencies, and with the tremendously increased facilities for mass education through such powerful media as the radio and motion pictures, the historian of the next thirty-years' war against blindness should be able to present a stirring story of what an enlightened people have done and are doing to make this a world of seeing people.

—LEWIS H. CARRIS
New York, N. Y.

News of State Activities

THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Brief and timely items only can be used, because of the limitations of space

District of Columbia

"On June 1, 1939, the District of Columbia Society for the Prevention of Blindness completed its second year of preschool vision testing. This project, started in November, 1937, is carried out in the Child Hygiene Centers of the District Health Department by trained Junior League members and other carefully selected volunteers. The technique used in testing the children was developed by the National Society for the Prevention of Blindness and may be used by non-medical workers to discover children whose vision is below the range of normal.

"In the current year, 450 children have been tested in the Centers. It is interesting to note that 336, or approximately 75 per cent, of this number have vision essentially normal, while 46, or ten per cent, have been referred for examination by an eye physician. There were 68, or 15 per cent, for whom the workers were unable to record the visual acuity because of lack of co-operation on the part of the children.

"The Society has also conducted vision tests in the parochial school system, and in the Child Welfare Department of Children's Hospital. In addition the trained volunteers were borrowed from the Society this year to help the Parent-Teachers Association in its Spring Health Round-Up. These volunteers assisted the ophthalmologists with the vision testing and in conducting the eye phase of the health examination.

"The Society has felt that the year's work has been most worthwhile, and those community agencies which have been given this service are urging that the vision testing project be continued another year."

—*District of Columbia Society for the Prevention of Blindness, Washington, D. C.*

Illinois

"As a result of the fine work which had been done on the Chicago WPA Eye Testing Project in September, 1938, the WPA was able to get an Eye and Ear Testing Project written for the whole State of Illinois. This project was approved late in July, just before the Annual Institute of the Illinois Society for the Prevention of Blindness for public health nurses. The WPA asked our organization to select six district supervisors and get them into the Institute for training. This we were able to do, although the time given was very short.

"During the year, 18 units have been opened in the state and the Illinois Society has co-operated in setting standards for personnel and techniques. We felt, however, that all the people engaged on the project should have special training directly under the Society and we therefore arranged for a three-day Institute in Chicago on June 13, 14 and 15. Thirty-five workers from the WPA Eye and Ear Testing Project were present at this Institute, plus eight nurses from the City Board of Health and one from the Chicago Tuberculosis Institute. The Society plans to hold local Institutes during the next year in the various WPA districts of the state.

"From September 1, 1938, until May 1, 1939, 1,070 schools were finished for vision testing; 74,019 children were examined; 66,933 were found to have normal vision and 7,086 to have defective vision. Of these defects, 459 were 3X cases, or below 20/70; 2,042 were 2X cases (between 20/40 and 20/70), and 4,585 were 1X cases (between 20/30 and 20/40)."

—*Illinois Society for the Prevention of Blindness, Chicago, Illinois*

Indiana

"The Committee on the Conservation of Vision of the Indiana State Medical Association plans to establish local organizations in each community, sponsored by the medical profession, for the conservation of vision. Co-operation of physicians and school nurses in larger cities, teachers and county superintendents of schools in smaller communities where no school nurses are employed, will be utilized to put the following program in effect:

"1. Immediate instillation of 1 to 3 drops of 1 per cent silver nitrate (beeswax ampoules) in eyes of newborn.

"2. Treatment of squint or cross-eyes as early as possible, preferably as early as three years of age.

"3. Examination of all school children for visual defects and immediate treatment of all defects found.

"4. Early detection and treatment for congenital and acquired syphilitic eye cases.

"5. Examination and furnishing necessary glasses to the medical indigent school children.

"6. Encourage visual tests of preschool children. Examination of vision during a general physical examination.

"7. Early recognition and treatment of trachoma—9 per cent of the total blindness in Indiana is caused by trachoma.

"8. Children with corrected vision between 20/70 and 20/200 should be in sight-saving classes.

"9. All school children with congested eyes should be referred to an oculist when possible.

"The Board of Health's questionnaire to hospitals asking for the number of ophthalmia neonatorum cases they had had during the past five years revealed 147 cases, while only a few had been previously reported. Of the children in Indiana's school for the blind, 15 per cent are blind from ophthalmia neonatorum.

"Indiana has had an ophthalmia neonatorum law for years, but the Board of Health does not want to embark upon its enforcement unless the medical profession requests that it do so. As a result of the ineffectiveness of the prevention of this disease to date, the committee recommends to the House of Delegates the following resolution regarding ophthalmia neonatorum:

> "Resolution on Ophthalmia Neonatorum Prevention, to be presented to the House of Delegates at the Ninetieth Annual Session, Fort Wayne, October 10, 1939. As it is recognized by our Committee on the Conservation of Vision of the Indiana State Medical Association that a high incidence of ophthalmia neonatorum exists in Indiana,
>
> "*Therefore Be It Resolved, That* the following recommendations prepared by that committee be adopted by the House of Delegates of the Indiana State Medical Association in order to reduce the incidence of this disease and so conserve vision of the citizens of our state:
>
> "1. That the question on the birth certificate, 'Were precautions taken against ophthalmia neonatorum?' be changed to read 'What preventive for ophthalmia neonatorum did you use? If none, state the reason.'
>
> "2. That legislation should be enacted specifying that only a prophylactic agent approved by the Indiana State Board of Health shall be used.
>
> "3. That one per cent (1%) silver nitrate be used in beeswax ampoules as a universal prophylactic agent for ophthalmia neonatorum at this time, with the reservation that this recommendation may be changed in the future.

"4. That the Indiana State Board of Health shall acquaint physicians, individuals and hospitals with this recommendation to see that it is uniformly easily available.

"5. That the Indiana State Board of Health shall carry on a campaign of urging the prompt and early reporting of ophthalmia neonatorum as the law now specifies.

"6. That the Indiana State Board of Health, through the local health officers, shall ask the prompt reporting of conjunctivitis of the newborn from whatever organism and shall have jurisdiction over these cases, in investigating and insuring adequate diagnosis and treatment until they are definitely classified as not being ophthalmia neonatorum. That investigation should be a direct responsibility of the Indiana State Board of Health and assured thereby.

"7. That consultation with oculists be urged in these cases whenever such consultation is available. That provision be made for expert ophthalmological and nursing care whenever necessary, and that these services be arranged without delay and be available also for similar emergency cases occurring at a later age, and

"*Be It Further Resolved, That* if these recommendations are adopted by the House of Delegates, they shall be transmitted to the Indiana State Board of Health, that legislation be enacted at the next session of the general assembly to strengthen the present ophthalmia neonatorum law according to the above recommendations, and that the delegates of the Indiana State Medical Association to the annual session of the American Medical Association to be held in New York, June 10–14, 1940, be instructed to present a resolution embodying similar recommendations to be adopted by the states throughout the nation.

"The committee also, realizing the widespread prevalence of trachoma in southern Indiana, its high incidence in the etiologic causes of blindness in Indiana, but also cognizant of the excellent program of the Blind Assistance Division of the Department of Public Welfare in its effort to eradicate this disease, recommends, because of its being a public health menace to our state, the following resolution to the Indiana State Board of Health, because it asks that it not be criticized for instituting such a program without a request from the Indiana State Medical Society, as follows:

"Realizing the prevalence of trachoma in Indiana and its high incidence in the causation of blindness,

Be It Resolved, by the House of Delegates, *That* the State Board of Health of Indiana shall be requested by the Indiana State Medical Society to carry on an active campaign against this communicable disease to try to eradicate it from the state. The laws relative to trachoma should be enforced with quarantine where necessary to see that it is adequately treated and cured if possible."

—*Committee on Conservation of Vision, Indiana State Medical Association, Fort Wayne, Indiana*

Kansas

"*Restoration of Eyesight Program.*—On April 14, 1938, the restoration of eyesight program for individuals who were recipients of aid to the blind was initiated. These persons were selected by the state supervising ophthalmologist, upon the recommendations of the examining ophthalmologist, where treatment was indicated for the purpose of restoring some vision, preventing further degenerative changes taking place, or to afford comfort for the patient. At the present time, 582 have been found eligible for treatment under the restoration of eyesight program. The opportunity for treatment is presented to the patient, and he may, or may not, choose to receive care for his eye condition; these programs are not compulsory. Many individuals refuse the opportunity of treatment because of age, fear of losing what small amount of vision they do possess, or because they feel that after treatment they might not be eligible for aid to the blind. If an individual wishes to receive treatment, he makes his own choice of doctor from the approved list of ophthalmologists. We feel that this plan affords a better working relationship between the ophthalmologist and the client, and this plan is received favorably by the ophthalmologists also. There are 104 cases under treatment at the present time, and 193 cases have received the benefit of treatment. Sixty-nine cases treated continue to be eligible for aid to the blind, and treatment has improved the vision of 124 cases to the extent that they are now removed from aid to the blind.

"*Prevention of Blindness Program.*—The Prevention of Blindness Program was initiated February 15, 1939. It was necessary to limit this program to cases needing treatment who had made application for aid to the blind, but were ineligible through their eye examination, providing they are now receiving some form of public assistance through the county office. The same procedure is used for the prevention of blindness program as is used in the restoration of eyesight program. Of the 421 cases reviewed, there are 73 cases eligible for treatment under the prevention of blindness program.

"*Sight-Saving Classes.*—It is the desire of the State Board of Social Welfare to promote the establishment of sight-saving classes in the public schools of Kansas, on a par with the standards as recommended by the National Society for the Prevention of Blindness. The State Board realizes that the city school boards are burdened with heavy budgets and that they could not be expected to make expenditures beyond the cost of educating a normally-sighted child. To those cities interested, the Board has seen fit to offer assistance in the equipping of a room up to the standards as recommended by the National Society, until such time as the State Legislature sees fit to incorporate sight-saving classes into its educational budget. The school boards are expected to furnish room, utilities, and a teacher prepared by special education to teach such classes. The Division for the Blind expects to furnish special equipment, such as special lighting, special preparation of walls, blackboards, windows, special desks, special books, and other incidental equipment recommended for these rooms.

"Scholarships were provided by the Division for the Blind for three teachers interested, with proper qualifications, to attend summer school this year for special training in sight-saving class work. It is anticipated that three classes will be established and ready for use by the first of September. The children selected as possible pupils for the sight-saving classes will have an ophthalmologic examination by an approved ophthalmologist on our list, selected by their parents. The state supervising ophthalmologist will determine their eligibility for the enrollment into these classes. The amount of the fees for this examination has not been determined as yet. However, the State Board intends to assume the payment of such fees."

—*State Department of Social Welfare of Kansas, Topeka, Kansas*

Louisiana

"The past twelve months have been characterized by several important developments in the function of our Society. Practically every problem which relates to more efficient functioning of our organization has been tackled with a desire to solve many of our prevention of blindness problems.

"Conserving the eyesight of the school children of our state has been one of our primary objectives. A program of sight conservation was carefully planned with the Health and Physical Education Department of the State Department of Education, and sight conservation was made their first objective for the year 1938–39. We believe if every child is to have the maximum opportunity for eye health during his school career, the eye health program in the

schools should insure for each child a thorough eye examination by an ophthalmologist, and continuous supervision of the child's eyes under treatment or in use. We expect to continue our efforts in this direction.

"We are particularly gratified with the prevention of blindness work which has been done in one parish by a branch chairman of our Society. This chairman, a skilled eye physician, has devoted time and energy to train the teachers and school nurses in this parish in the simple techniques of testing visual acuity. More than 1,000 school children were given eye examinations and a correction of remediable defects has been made. Procedure of follow-up work has been done in such a manner as to include arrangements by school nurses for clinic appointments and appointments with competent specialists in their field.

"The State Department of Education has endorsed and accepted an eye chart prepared by our Society for use in testing the visual acuity of school children. This chart, which was also endorsed by the State Board of Health, was included in the teacher's manual and all schools supplied with proper sized charts for making vision tests. For this chart and instructions, acknowledgment is made to one of our parish branch chairmen.

"Excellent prevention of blindness work has been done by a volunteer organization. This organization in its consideration of child welfare, and working under the strict supervision of our Society, has been responsible for more than 200 school children receiving special eye care this year. All necessary follow-up work has been done and a correction made of remediable defects.

"With a view to arousing public interest in prevention of blindness, a general sight conservation program was prepared—61 organizations have availed themselves of the opportunity of presenting this program at one of their meetings. Through this medium several hundred people have been made more familiar with the objectives of our Society and have been aroused to the urgent necessity of the tremendous need of the continuation of this type of work.

"During the past year we have arranged exhibits and actively participated in six state conference meetings. Two students who graduated from the high school sight-saving class are planning to matriculate at a university this fall. These students will enroll under a work scholarship and it has been the happy privilege of our Society to have these students placed in such duties as will not be likely to further impair their vision.

"Our prevention of blindness program has more recently included in its activities a campaign for larger type in school textbooks, magazines and periodicals. A committee has been appointed and

is actively at work on this matter and we hope to approach the solution in a systematic and comprehensive way."

—*Louisiana Society for the Prevention of Blindness, New Orleans, Louisiana*

Missouri

"The Committee on Conservation of Eyesight sponsors the following activities:

"1. Education of school children and the lay public generally in the matter of conservation of eyesight through personal addresses and showing of films throughout the state.

"2. In this the aid of the Councilors, the county medical authorities, the Woman's Auxiliary and county health officers would be enlisted.

"3. To disseminate proper publicity in the daily press and the medical press and to counteract adverse publicity.

"4. To keep in touch and co-operate with: The National Society for the Prevention of Blindness, the Missouri Commission for the Blind, the American Academy of Ophthalmology, the American Medical Association and all other recognized national and local organizations interested.

"5. Prepare a few safe rules concerning conservation of eyesight for distribution in pamphlet form at lay meetings.

"6. For the purpose of enlisting aid of county societies, each member of the Committee was assigned the following Councilor Districts: Councilor Districts 1 and 2, Dr. Forgrave; Councilor Districts 3 and 10, Dr. Luedde; Councilor Districts 4 and 5, Dr. Dyer; Councilor Districts 6 and 7, Dr. McLeod, and Councilor Districts 8 and 9, Dr. Post.

"Each member of the Committee, keeping in mind the foregoing, volunteered to prepare an outline of duties and policies under which the Committee would operate. The Chairman suggested he would prepare such an outline and forward to each member of the Committee for further suggestions and additions.

"The Committee approved the suggestion that county medical societies be encouraged to appoint local committees on conservation of eyesight and that each member of the Committee enlist the aid of the Councilors in the districts as assigned as well as 'key' men in various county medical societies to assist in carrying out the objectives of the Committee's program of lay education.

"It was suggested that the Secretary have reprinted copies of the resolution adopted by the Council at its meeting on April 15, 1938, concerning the co-operation of the National Education Asso-

ciation and the American Medical Association in eyesight conservation, the purpose of such reprints being to give them to school superintendents when making arrangements for presenting programs in schools.

"A state-wide Speakers' Bureau of qualified eye physicians to cover all local meetings and nearby counties that do not have specialists was suggested. These speakers need not be members of the local county committee.

"The Chairman reported an invitation had been received from the Mississippi Valley Medical Association to place an exhibit depicting the Committee's work and objectives at a forthcoming session. The Chairman was authorized to prepare such an exhibit if satisfactory space would be assigned and the material prepared.

"The Chairman called attention to an exhibit to be shown at the American Medical Association San Francisco Session on the medical aspect of aid for the needy blind, prepared by the United States Public Health Service and Dr. Conrad Berens, and that perhaps worthwhile material might be obtained from this source.

"The Secretary stated he would prepare a list of physicians specializing in eye, ear, nose and throat work in Missouri by Councilor District for the information of the Committee members when the new edition of the American Medical Association Directory was released.

"It was suggested that the members give some thought to stress as a Committee objective a preschool eye test by atropin; also, the advisability of gathering information as to the reliability of various equipment now on the market for the purpose of disseminating such information to physicians on request.

"The Chairman assisted in the passage of the anti-fireworks ordinance in St. Louis City and in Webster Groves, and other members have urged that a similar ordinance be passed in their communities. A statute covering this great menace to the eyesight should be introduced in the legislature and supported by all physicians.

"A résumé of the work of the Committee includes (1) forty-five addresses and showings of the film, 'Seeing How You See' to medical societies and lay audiences of approximately 6,975 individuals; (2) seven radio talks; and (3) exhibits at the Missouri Valley Medical Association, the Kansas City Southwest Clinical Society Conference, a Councilor District meeting at Joplin, a Child Health Conference in Kansas City, and several other meetings. Approximately 2,000 persons viewed the exhibits."

—Committee on Conservation of Eyesight, Missouri State Medical Association, St. Louis, Missouri

New York

"The Prevention of Blindness Service of the New York State Commission for the Blind has completed summer lectures on eye hygiene and medical social follow-up care at Syracuse University, New York University, and the State Normal School, Buffalo. These lectures are given in connection with public health nursing programs and courses for sight conservation teachers. This marks our tenth year of participation in these university courses. Through these affiliated courses, knowledge regarding eye conditions is constantly being extended. This program stresses the importance of early eye examinations and follow-up care as recommended by eye physicians. It broadens the service of social and health workers in the field, and aims to serve the public through the specialized facilities of the Commission for the Blind."

—Prevention of Blindness Service, New York State Department of Social Welfare, New York City, New York

Pennsylvania

"The Reporting Bill introduced to amend the Act of 1913 regarding ophthalmia neonatorum, and passed by the legislature, was signed by the Governor late in June and so became enacted into law. Incidentally, this bill was written by the State Council for the Blind.

"Pennsylvania celebrated its first Fourth of July with a state-wide ban on fireworks, exclusive of paper caps for pistols, etc. Reports throughout the state were favorable. In Allegheny County, we have record of nine slight injuries, none of which were eye injuries. It is interesting to note that three of these accidents were caused by paper caps.

"The Pennsylvania Association for the Blind is planning its Inter-Branch Conference, which is to be held this year at the Abraham Lincoln Hotel in Reading, Pennsylvania, on November 2, 3, and 4. Programs are being planned for prevention of blindness and for work with the blind."

—Prevention of Blindness Department, Pennsylvania Association for the Blind, Pittsburgh Branch, Pittsburgh, Pennsylvania

"The Medical Society of the State of Pennsylvania will continue its activities in the field of sight-saving through its central committee on Conservation of Vision with the co-operation of the various similar committees of the several county medical societies throughout the state. In the last year or so, concentrated effort has been made to bring more of our eye physicians to accept the grading of the American Board of Ophthalmic Examiners, which brings the educational phase of the work to a higher level and stimulates

further post-graduate work. The enthusiasm thus created is expressed by more intensive work upon the part of the eye physicians in their respective communities and, we feel, developed a greater degree of public welfare consciousness."

—*The Medical Society of the State of Pennsylvania, Committee on Conservation of Vision, Philadelphia, Pennsylvania*

Tennessee

"Until the beginning of the biennium, July 1, 1937–June 30, 1939, the Tennessee Department of Public Health had a field force for the control of trachoma. The program consisted of case finding and surgical treatment of active cases of the disease. Due to the fact that the problem was small, it was decided to discontinue this program. The number of cases needing treatment did not justify the employment of full-time personnel.

"Arrangements were made with the Kentucky Department of Health whereby cases needing surgical treatment could be hospitalized in the Trachoma Hospital at Richmond, Kentucky. A per diem cost of two dollars per patient was necessary for the expenses of hospitalization. Thirteen residents of Tennessee were hospitalized during the biennium, 1937–1939."

—*Commissioner of Public Health, State of Tennessee, Nashville, Tennessee*

"On the first of July, this Division completed its first year of service and recorded the following achievements. During its first year, 175 persons had sight restored to them from 2 to 100 per cent in one or both eyes by surgery and glasses, by surgery alone, or by glasses alone; 108 of this group were children, and 67 were adults. Thirty-eight of this group had 52 surgical operations; 25 of these persons have had 33 operations to restore sight; ten persons have had 14 operations to prevent blindness, and the remaining three persons having five miscellaneous eye operations—either preliminary operations to store sight or to straighten the eyes. Two of the operations to restore sight were failures, and one to prevent blindness has apparently been a failure, although the operation itself was successful and a later report may prove that this case may not have to be classified as a failure. Thirty-three of these persons were adults and five were children. Thirty-four persons, 23 being children and 11 being adults, are being prevented from going occupationally blind from amblyopia exanopsia in one eye, and 35 persons, 28 being children and seven being adults, are being prevented from going blind in both eyes from amblyopia exanopsia simply by the wearing of glasses to exercise the vision present and by orthoptic training. However, more orthoptic clinics are needed

and this will be sought for during the next year. Nine persons are being prevented from going blind by ophthalmic care and treatment. They are: three cases of glaucoma; two cases of trachoma; a case of congenital syphilis; a case of corneal ulcers; one case of secondary optic atrophy from chronic sinusitis; and one case of epithelioma of the left lower lid, which is being treated by *x*-ray. Thus the total number of persons for whom blindness is being prevented is 87. Seventy-eight children have been found who are eligible for enrollment in sight-saving classes, 11 of them being enrolled in our class this last year, one of them dying during the school year, who should have their sight conserved and blindness prevented by sight-saving class methods.

"In the educational drive which was carried out during the year, to acquaint the public and the medical profession with the things which they could do to assist in the prevention of blindness and conservation of vision, 36 talks were made by the head of this Division, which reached approximately 4,275 persons; silent motion picture on the prevention of blindness was used twice and the talking film on the nurse's contribution in the prevention of blindness was used 17 times. These films reached approximately 2,200 persons. Last July three radio stations in Nashville, one in Chattanooga, one in Knoxville, one in Jackson, and one in Memphis utilized the transcribed fireworks program, prepared by the National Society for the Prevention of Blindness, thus covering the entire state and resulting in bringing up before the legislature a bill prohibiting the sale and use of fireworks in the state. Although this bill was not passed, it is expected that one will be presented at the next meeting of the legislature in 1941, and it has made the citizens of the state so conscious of fireworks injuries that at this time no report of fireworks injuries of any nature, during the past Fourth of July celebration, have come to the attention of this Division, and it was noted that only about one-tenth of the amount of fireworks were heard this year in Nashville as were heard last year.

"This Division which, during the past year, operated first under the Department of Education, then under the Department of Institutions and Public Welfare, and then under the Department of Institutions, has been transferred into the Department of Public Health where it will continue to operate during the next fiscal year, and we hope for the future."

—*Prevention of Blindness and Conservation of Vision, Department of Public Health, Nashville, Tennessee*

Washington

"In order to determine the eye conditions of school children in Kitsap County, the Division for the Blind, State Department of

Social Security, has co-operated with the local Lions Clubs, school and health authorities in a vision testing project. Begun in October, 1938, to reach approximately 4,000 children, the program was sponsored by the Blind Aid Committee of the Lions Club in conjunction with the county and city superintendents of schools, teaching staffs, County Health Office, and the school and city nurses. All of the children in the rural schools and those in the fifth grade in the city schools were tested; the Snellen test was used throughout.

"Follow-up work has been completed and a complete report of the project compiled, indicating that 347 children were referred to eye physicians for examination. It was found that 135 of the referred group had apparently normal vision, 20/20, but showed such symptoms as sties, granulated eyelids, swollen eyes, complaints of eyestrain, headaches, etc., so it was thought advisable to ask for examination, and if there was an eye defect there would be the advantage of early attention.

"While the situation did not seem to warrant recommendations for the establishment of a sight-saving class, further follow-up work will indicate changes in the situation which might lead to such action.

"While this project was the first of its kind to be undertaken in the state, interest in other areas has been evidenced and it is probable that other Lions Clubs will sponsor such projects in the future."

—*State Department of Social Security, Division for the Blind, Olympia, Washington*

Territory of Hawaii

"The Territorial Bureau of Sight Conservation and Work with the Blind was one of the few departments which had its budget approved in full by the Legislature. This budget gives $48,492.00 to the Bureau's activities for the biennium July 1, 1939, to June 30, 1941.

"The Bureau has employed as field workers: Mrs. Dora Zane, Medical Social Eye Worker for the Island of Oahu; Miss Florence Carr, Field Worker, Island of Hawaii; Miss Rebecca Stoddard, Field Worker, Island of Maui; Miss Grace Yee, Field Worker, Island of Kauai; Mrs. Wai Jane Char, Social Worker for the Blind, Oahu.

"All the workers have had some training in social work and specific training in sight conservation. It is the ambition of the Department to have all field workers graduates in medical social eye work. Plans are being formulated to rotate workers for educational leave.

"September 1, 1939, the Bureau will organize a new sight-saving class at Waipahu Elementary School in Rural Oahu. This makes the seventh sight-saving class organized in Hawaii since September, 1934. The sight-saving classes are as follows: Kawananakoa Intermediate, Oahu—Miss Elinor Johnson, teacher; Kawananakoa Elementary, Oahu—Mrs. Ruth Fisher, teacher; Waialae Elementary, Oahu—Miss Alta Worden, teacher; Waipahu Elementary, Rural Oahu—Mrs. Marie Hoagland, teacher; Lihue School, Kauai—Miss Bessie Wiebke, teacher; Kahului School, Maui—Miss Wong, teacher; Hilo, Hawaii, Mrs. Frield, teacher.

"Through the volunteer corps of the Bureau, the sight-saving classes have had transportation arranged for field trips. We feel that this is a very important part of our work as assistance in sight-saving development."

—*Territorial Department of Sight Conservation and Work with the Blind, Honolulu, Territory of Hawaii*

Note and Comment

Traffic Court Cases and Visual Abnormalities.—The Psychopathic Clinic of the Detroit Recorder's Court for traffic offenders operates a special division utilizing appliances and standards for testing of safe vision, says Lowell S. Selling, M.D., writing in *The Journal of the American Medical Association* on "Abnormalities of the Eye and Their Significance in Traffic Court Cases."

The clinic employs special apparatus for testing traffic violators to determine depth perception, visual fatigue, judgment of speed and distances, and other psychophysical tests in which vision is important. Commenting on accepted reports that more than 67 per cent of traffic accidents occur between 6 P.M. and 6 A.M., this report emphasizes the extreme importance of the ability of the eye to function at night. Study of 40 control cases failed to show any marked distinction between the recoverability of the fatigued eyes of traffic violators and the unfatigued eyes of the control group. Glare sensitivity tests of another and larger group of subjects indicated that glare sensitivity does not necessarily increase with age, and that Negroes are much less glare-sensitive than members of the white race.

Examinations of the field of vision were conducted to check on the frequency of limitations in traffic violators. Of a total of 716 persons passing through the clinic, only five were found to have less than 140-degree angles of vision for movement with corresponding visual fields for colors. Color vision was found to be defective in a surprising number of subjects. Five per cent were red-green blind, but, on checking these drivers with a traffic semaphore, all but three were found to distinguish readily a green from a red traffic light, and none of the color-blind group had serious traffic records, none having passed a red light as compared to many among the normally-sighted group. The clinic therefore is disposed to minimize the importance of color vision in safe driving.

New English Magnet for Extraction of "Foreign Bodies."—Mr. N. Bishop Harman writes of his receipt of an improved hand magnet of English manufacture which should be found most useful

by eye surgeons practicing in districts where the presence of iron and steel foundries produces a high incidence of metallic foreign bodies in the eyes of workmen. A technical description follows:

> "This magnet is a cylindrical bar of steel, 4 inches long and ½ inch in diameter, weighing 4½ ounces. It is of a steel alloy with a high cobalt content; it has a lower density and a much greater lifting force than the old carbon-steel magnets. It does not suffer from aging, and is stable at fairly high temperatures and under ordinary mechanical shock. Also, it is stated to be very resistant to artificial aging by external magnetic fields— for example, direct-current apparatus or lightning flashes. Its lifting power is amazing; a one-pound weight from the kitchen scales was lifted and held with ease. One pole of the magnet is drilled to receive interchangeable pole pieces with probe ends; of these there are four. The whole is chromium-plated. The pole pieces may be boiled, but the magnet is better sterilized by soaking in alcohol or 5 per cent carbolic solution . . ."

Sun Glasses Are Now Standardized.—The National Bureau of Standards has now adopted commercial standards sponsored by the Sun Glass Institute, Inc., by means of which the public is assured of obtaining at moderate cost sun glasses containing lenses free from optical defects. A distinctive mark indicating that the merchandise meets these requirements will shortly appear on the sun glasses manufactured and sold under the adopted standards. Slip-on types will be available for spectacle wearers who cannot afford corrective tinted lenses for outdoor wear.

Occupational and Social Disablement from Past Interstitial Keratitis.—A Danish study of impairment resulting from interstitial keratitis has been conducted through comparison of the personal histories of a large group of past patients belonging to the working and trade classes, averaging just over thirty years of age and with an average observation period of twenty years, as reported in the *British Journal of Ophthalmology*.

The material presented indicates that slightly over half the group examined professed ignorance of the nature and cause of the underlying infection, the others admitting knowledge of a family history of syphilis. Particular emphasis was laid on ascertaining the de-

gree of disablement in terms of practical earning capacity and social condition. Fourteen per cent of subjects admitted disablement corresponding to one-third of normal working capacity. Nearly 80 per cent represented themselves as perfectly capable of work, and seven per cent, only partially able. The incidence of interstitial keratitis in youth was considered socially as well as economically favorable, permitting the resulting handicap to influence decision as to the ultimate occupation selected. Childhood incidence of the condition had necessitated absence from school for periods of one month to three years in about 25 per cent of patients; but comparatively few reported that initial development of the condition after school age necessitated changes in occupation to simpler and less exacting work, and very few subjects gave details indicating any reduction in social standing attributable to their complaint or knowledge of its cause.

Of the pathological changes causing impairment of vision which ranged from five to 100 per cent, corneal opacity was found most frequently, with refraction anomalies and choroiditis considerably less often noted, and cataract and bulbar phthisis even more infrequent. On comparison of the length of the observation period with the percentage of disablement it was found that disablement was increasing markedly with the length of the observation period, due to the development of cataract, cyclitis, choroiditis, and glaucoma.

London Ophthalmic Hospital Protests War-Time Move.—In the experience of doctors who have studied the nature and extent of Chinese and Spanish war-time injuries to civilians, air raids such as are feared by the European capitals at the present time seldom produce minor wounds of the eye or other members. It is their opinion that a very great percentage of casualties are of a fatal or at least a very grave nature. Acting upon these findings, the Secretary of the Royal Westminster Ophthalmic Hospital in London has protested in a published letter the proposal to remove the medical and nursing staff, the instruments, appliances, and equipment from London to a base hospital a safe distance outside the city, there to operate as a first-aid post for "slightly injured" eye cases. It is the Secretary's contention that London's ophthalmic surgeons should remain in London in order to render immediate and

skilled assistance to the greatest number likely to require surgical intervention.

Ophthalmic Casualties in Air Raids, *British Journal of Ophthalmology*, April, 1939, issued monthly by The British Journal of Ophthalmology, Ltd., London, England. Special hospitals in London and other large English cities are to be commandeered for the treatment of casualties of all kinds, in the event of war. This article stresses the desirability of having ophthalmic casualties dealt with by specially trained units, being evacuated as soon as possible after injury from the danger zone. It is suggested that a mobile ophthalmic unit in a motor ambulance with operating equipment tour the first-aid posts in its area, facilitating prompt treatment for minor cases and relieving general hospitals of the burden of accepting and evacuating such cases.

Presbyterian Hospital's Institute of Ophthalmology Report.—In presenting its seventieth annual report the Presbyterian Hospital in the City of New York includes a brief but significant report by the Directors of the Institute of Ophthalmology who pay tribute to their late director, Dr. John M. Wheeler. They give details on the growing scope and activity of the John M. Wheeler Library, which now contains over 3,000 books and a collection of 2,000 lantern slides.

The growth of the institute may be measured by the increase in number of patients admitted and operations performed, as well as by the volume of work in the department of pathology.

During the year the resident instructional program was augmented by lectures and laboratory courses in physiology, pharmacology and anatomy, and members of the Institute co-operated with the Proctor Clinic of Santa Fe, New Mexico, in providing eye care to indigent Mexicans of the region. This work is expected to continue under the joint guidance of the Institute and the Clinic.

Investigative studies of the Institute residents in 1938 covered the following subjects: the visual field; retinal dark adaptation; effects of sulphanilamide on experimental keratitis in rabbits; and capillary fragility as related to retinal hemorrhage.

A volume of Dr. Wheeler's collected publications will soon appear under the sponsorship of the Institute.

Leonardo da Vinci: His Contributions to Ocular Science.—As the ancient city of Milan, through a magnificent commemorative exhibition, pays tribute to the many-sided genius of Leonardo da Vinci, a recent issue of *The Optician* (London) emphasizes again the significance of this great figure's contribution to optical science. Leonardo was among the first to undertake a serious study of human anatomy, and of the structure and function of the eye. His cubical box into which light rays were admitted through a small hole was the forerunner of the camera obscura, to the perfecting of which a friend contributed the convex lens to replace the pinhole. Leonardo made studies of binocular vision, of three-dimensional images, and of the laws of perspective. Progressing simultaneously in art and science, he noted in his diary a date on which he began writing a treatise on optics and modelling an equestrian statue. Realizing the importance of plentiful light, he added to the lamps suspended from his ceiling, and secured better working illumination by designing for his own use an oil lamp in which the wick rose as the fuel was consumed. As a wearer of spectacles in later life, Leonardo questioned the causes of decreased vision in men of advancing years. When his own sight began to decline he became more interested in explaining failing vision.

A favored diversion of the artist was the solution of optical illusions. He observed the seemingly small sizes of objects perceived against brilliant backgrounds; and that of two identical objects differently illuminated, the more brightly lighted appears larger. His appears to have been the first correct explanation of irradiation, which causes a red hot length of iron rod to appear thicker than an unheated segment.

Optical illusions caused by reflection he explained as the result of many original and ingenious experiments. Studying problems of lighting, he noted, "Darkness is lack of light; shadow is diminution of light." He accompanied his written deduction by geometric drawings illustrative of "primitive" and "derived" shadows, claiming the existence of three types of shadows, determined by the intensity of light. Anticipating later scientists, he theorized that the intensities of two lights might be measured by their shadows. He was delighted at the wealth of his own discoveries regard-

ing vision and the eye, and, convinced of their correctness, planned to expound them in a work of many volumes.

Erecting an observatory and making notes regarding "glasses for seeing the moon magnified," Leonardo contended that the earth was but one of many bodies in the heavenly system—another planet, and not the center of the universe. He wrote, "The sun does not move," and anticipated Copernicus' theory of the motion of the earth. He had already invented a collapsible telescopic tube, and later realized that the twinkling of the stars was yet another illusion such as he delighted to explain. His adjustable frame for a telescope was not utilized until Galileo's day, a century later. Supplementing his astronomical studies, he invented a mechanism for producing concave metal mirrors.

Toward the end of his career, Leonardo da Vinci turned to a revision of his earlier "Treatise on Painting"; dissatisfied with his own treatment of the laws of perspective, written twenty years before, he undertook a specialized study of the optical principles of perspective, supplementing and clarifying the text in the light of his own artistic and scientific growth.

New Equipment Reveals Malingering in Eye Injury Claims.—Occasional instances of malingering by "injured" plaintiffs, and the filing of fraudulent claims for alleged accidental blindness, have led to the perfection of an accurate and dramatic test which recently determined the settlement of a $50,000 damage suit in Akron, Ohio. The plaintiff, alleging that injury sustained in a motor accident involving a trucking company had destroyed the sight of his right eye, was stated in court by the examining physician to have equal vision in both eyes. Application of the "eye shamming" test at the trial brought a verdict of dismissal of the claim.

A new material which polarizes light so that it vibrates in one plane only is employed in the testing device, which includes a projector, a screen on which to project test letters, special spectacles for the subject, and a cross slide equipped with special lenses for use in the projector. The secret of this infallible test lies in the fact that the examiner is able to cut off the line of sight between the subject's eye and the letters projected on the screen, while the subject is unable to determine with which eye he is seeing. Dis-

crepancies between alleged loss of vision and demonstrated visual acuity are thus made apparent, and malingering is impossible.

Changes in European Ophthalmological Journals.—A note in the *British Journal of Ophthalmology* announces the amalgamation of the *Archiv für Ophthalmologie* and the *Archiv für Augenheilkunde.* It further states that the *Zeitschrift für Augenheilkunde* will hereafter appear as *Ophthalmologica*, an international journal of ophthalmology in English, French, and German, published at Basel, Switzerland.

Eyes for the Eye Remedy.—Sydney R. Montague in *North to Adventure* wrote the following, which we reprint from *The Magazine Digest,* June, 1939: "It was during a visit of mine to Chief Charlie's settlement that I watched a small Eskimo child chewing on a hard candy, and I wondered how he could have got hold of it. Then I discovered that the candy was the round globule of a fish eye. It was rather sickening to the stomach, but inquiry brought out the information from the natives that 'the fish eye gives good sight.'

"That might be called superstition only for the fact that in the Mayo Research Clinic at Rochester, Minnesota, one now finds the doctors dissecting codfish eyes and distilling a new fluid which they, for the present, administer to the guinea pig and to the rat, but they are finding that if it is not a complete renewer, it is a distinct stimulant for human sight."

Committee on Prevention and Social Treatment of Blindness Pays Tribute to its Chairman.—The vice-chairmen, Audrey W. Hayden and Grace S. Harper, of the Committee on Prevention and Social Treatment of Blindness of the National Conference of Social Work, passed the following resolution in connection with the services of their chairman, Mr. William E. Bartram, executive secretary of the Ohio Commission for the Blind:

> "The Committee on Prevention and Social Treatment of Blindness desires to express its appreciation to the Chairman of the Committee for his efforts and accomplishments in securing a place on the program of the National Conference of

Social Work for the past two years. The Committee feels that this has been a tremendous step in advance in bringing the needs and welfare of the blind of the country before the members of the National Conference as a whole. It is further felt that only through persistent effort and excellent organization on the part of the Chairman has this field of work been recognized in the National Conference.

"The Committee therefore extends its hearty congratulations to the Chairman and places itself on record as paying tribute to this outstanding service which has brought recognition of the needs and problems of the prevention and social treatment of blindness into a larger field of social effort."

Current Articles of Interest

Pilot Fitness for Night Flying, C. E. Ferree and G. Rand, *Science,* March 10, 1939, a Weekly Journal devoted to the Advancement of Science, published weekly by the Science Press, New York, New York. In their report, the authors emphasize the following points:

"Light sense tester, correct in principle and convenient for use, is an important instrument for testing pilot fitness for night flying.

"Important functions to be tested are: (a) the ability to see at night and at low illumination, and the effect of dark adaptation on this ability, and (b) the amount and speed of dark adaptation. Normal or better-than-normal sensitivity in light adaptation is also important. The eyes that are needed for night flying are the best of what might be called the normal group; that is, of those that have both good dark and good light vision. More important than speed and range of adaptation, however, is the place in the scale of sensitivity at which the adaptive change occurs. Some eyes have a good range and speed of adaptation, but the adaptive change begins so low in the scale of sensitivity that they never attain the degree of sensitivity that gives the special fitness needed for night flying. The results of . . . study show also that age about 35 years exerts an important effect on the power of the eye to adjust itself for seeing at low illumination. From this it would seem that the testing of the light sense renders an additional service in helping establish the case against age as a disqualifying factor for night flying and of presenting evidence against those who wish to continue in this capacity beyond their time of fitness.

". . . In relation to fitness for night flying it is perhaps well to point out again that neither speed nor amount of change of sensitivity is as important as place in the scale of sensitivity at which the adaptive change occurs. That is, it is quite possible that a candidate might have a good range and speed of adaptation and still a comparatively poor power to see at low illumination both at the beginning and end of dark adaptation. Such a person would obviously be unfit for night flying. The night flyer should have normal or better-than-normal ability to see objects the instant he

looks from the cockpit to the outside world, as well as normal or better-than-normal power to increase this ability as dark adaptation is prolonged."

The Distribution of Sulfanilamide in the Eye, John G. Bellows, M.D., and Herman Chinn, Ph.D., *Journal of the American Medical Association,* May 20, 1939, published weekly by the American Medical Association, 535 North Dearborn Street, Chicago, Ill. Supplementing earlier reports from other sources of encouraging results obtained in sulfanilamide treatment of trachoma, gonorrheal ophthalmia and other eye affections, the authors have undertaken a detailed study of the distribution of sulfanilamide in the eye under various circumstances. In this experiment the drug, in single massive doses considerably higher than those recommended for clinical use, were administered by stomach tube to dogs. The aqueous humor was aspirated and a blood sample drawn after intervals of one, two, three, four, six, twelve, twenty-four and forty-eight hours. Studies of the eyeball, enucleated at the end of this period and dissected into lens, vitreous humor, corneoscleral layer and chorioretinal layer, revealed very rapid penetration of sulfanilamide, traces of which were detected in each of the ocular layers and tissues. Rising rapidly between the second and third hours, this evidence was most marked at about the sixth hour, except in the case of the crystalline lens where concentration rose sharply between the fourth and sixth hours, and reached its peak about the twelfth hour. The effect of the drug given in therapeutic doses was next investigated, gelatin capsules being given four times daily. Analyses were performed as before on the enucleated eyes. The same amount of sulfanilamide given in two daily doses produced very little difference in the sulfanilamide content of the tissues, the divided therapeutic doses resulting in a far lower sulfanilamide concentration than in the first experiment.

An effort was made to determine the effect of heat and drugs in increasing the concentration of sulfanilamide in the eye as the result of a single dose, but no appreciable difference was detected between an eye receiving no treatment and one to which heat had been applied for a two-hour period, or which had been treated with ethylmorphine or atropine. However, the aqueous humors of eyes

treated with mecholyl showed a distinct increase in sulfanilamide content.

Attempting local rather than oral administration of the drug, sulfanilamide was dusted directly onto the conjunctival sac and cornea of test dogs, remaining on two hours. After repeated irrigation and scraping of the epithelial layers, the reactions of the underlying subconjunctival tissue and corneal stroma were positive; but when 1 cc. of a saturated solution of sulfanilamide was injected subconjunctivally, a far lower concentration was found in the aqueous than when the drug had been orally administered.

The authors comment as follows: "The ready permeability of all tissues thus far examined to sulfanilamide is undoubtedly an important factor in its therapeutic efficacy. The data here presented show that the tissues of the eye can be included in this group. The distribution of the sulfanilamide in the various ocular tissues is of interest. The chorioretinal layer possessed the highest concentration of the drug, very closely approximating that found in the blood. This layer is also the most vascular tissue of the eye. Next in order, both of vascularity and of sulfanilamide concentration, is the corneoscleral layer. The aqueous humor possesses the next highest concentration, with the vitreous humor and the lens (an avascular tissue) bringing up the rear. These observations suggest that simple diffusion is the chief mechanism in operation and that the tissues do not act to concentrate the drug. The aqueous and vitreous humors obtain the compound by dialysis from the blood. The lens, having no blood supply, must secure its portion from the surrounding media. This indirect transfer plus the presence of a lenticular capsule results in the slower building up of the peak in the lens and conversely in a slower depletion.

"The daily portion of sulfanilamide given in two divided doses maintained practically the same level in the eye as the same quantity administered four times a day. The chart shows that the drop in the various tissues and fluids from the sixth to the twelfth hours is slight; consequently ingestion of the drug every twelve hours should be almost as effective as every six hours. There is no apparent explanation for the difference between the values reported for men and the considerably lower levels obtained by us on dogs."

Treatment of Lime in the Eye, G. C. Pether, M.D., *British Medical Journal,* April 1, 1939, published weekly by the British Medical Association, Tavistock Square, London, England. In industrial plants generally and particularly in the manufacture of lime, the eyes of workmen are frequently exposed to flying lime particles, first-aid removal of which is here recommended by means of a camel-hair brush smeared with a mixture of equal parts liquid paraffin and vaseline. Immediate and copious irrigation of the eye with clear water or boric acid solution may remove lime dust without resorting to further emergency measures, but larger particles adhere to the smeared brush and may be withdrawn with comparable readiness. Attention is called to the fact that many workmen report for first-aid treatment complaining of but vague discomfort whose eyes show, concealed in the folds of the upper or lower lid, large lime particles which may be speedily extracted by this means, although the surface layers of the lids have a tendency to close over the foreign substance, obscuring it from immediate detection. Experiments conducted with other than boric acid solutions and ammonium tartrate indicate that a four per cent solution of ammonium chloride is effective and well tolerated. Lime burns of the eye are also responsive to the same irrigation, and the ammonium chloride solution may be used with equal success some time following the initial emergency treatment of the eye.

Researches on Industrial Lighting.—The Lighting of Power Presses, *Transactions of the Illuminating Engineering Society,* February, 1939, published monthly except August and October by the Illuminating Engineering Society, 51 Madison Avenue, New York, N.Y. In the Preface to the eighth in a series of Industrial Research Projects completed by the I. E. S. Committee on Industrial and School Lighting, and printed in this issue, Henry B. Dates, chairman, observes that conditions still prevail which are far from flattering either to industry or to the lighting business, average industrial lighting as it exists today having been found much below the standards which must prevail if good seeing conditions are to become the rule. Regarding the complex problem of the adequate lighting of power presses, the chairman states:

"It has long been recognized that the operation of power presses, both large and small, has presented problems of illumination that have been quite difficult of solution due to the nature of the design of the press equipment, the changes in these designs, and the multiplicity of operations.

"The purpose of this investigation was to study the seeing problems involved in the operation of such equipment and to determine satisfactory methods of illumination from the standpoint of quantity and quality of light, distribution, contrast and brightness and safety."

The Ophthalmoscopic Signs of Constitutional Disease, Arthur J. Bedell, M.D., *Journal of the American Medical Association,* March 18, 1939, published weekly by the American Medical Association, Chicago, Illinois. The background of the eye is the stage on which many of the tragedies of life are enacted, according to this detailed and strikingly illustrated study of the ocular changes by means of which the physician may search for, study or confirm diagnoses of constitutional diseases. Admitting that correct interpretation of every pathologic sign is a life study, it is pointed out that by the use of an ophthalmoscope and a little time and concentration, every physician should be able to recognize the fundus signs of the major vascular changes and those caused by diabetes, hypertension, nephritis, syphilis, tuberculosis, intracranial pressure and optic nerve inflammation. In closing, the author states: "To the initiated, examination of the fundus discloses important clinical signs which, when gathered together, form part of the life record of the patient. From the knowledge gained by the study of thousands of such reports, accurate prognostic as well as diagnostic conclusions can be drawn."

Book Reviews

REFRACTION OF THE EYE, Alfred Cowan, M.D. Philadelphia: Lea & Febiger, 1938. 319 p. ill.

This book is the rather logical result of culmination of Cowan's earlier book, "Ophthalmic Optics," now, however, including refraction of the eye. The section on optics is presented with detailed experiments and examples to establish a fundamental knowledge essential to the consideration of refraction. The first ten chapters cover this matter of physics of light as it applies to ophthalmic optics. The last nine chapters are given over to its clinical application—that is, to refraction, and the technique of ordering correcting lenses. The last chapter is a rather valuable one in that he covers therein the various mechanical aids to amblyopia, as contact glasses and telescopic spectacles.

This combination, as it appears in Cowan's book, of the fundamental physics of refraction, his discussion of lenses (especially thick lenses and ophthalmic lenses), with its subsequent application to the normal and abnormal eye in the optical treatment of ametropia, is in brief the subject matter; lucidly presented and reflecting well his great experience in the practice and the teaching of optics and refraction.

—EDMUND B. SPAETH, M.D.

EYESTRAIN AND CONVERGENCE, N. A. Stutterheim, M.D. London: H. K. Lewis & Company, Ltd., 1937. 89 p. ill.

The subject matter can be divided into several sections: the discussion of eyestrain and convergence in the first 58 pages; a summary thereof in English, French, German, Spanish, and Italian; and thereafter 21 pages wherein the author surveys the results of one hundred cases of kinetic treatment for asthenovergence and eyestrain, presenting in addition to this survey a more detailed analysis of 19 more cases.

Stutterheim feels that a very large percentage of cases of ocular inefficiency are connected with weakness of convergence, and that in the largest number of cases insufficient attention is paid to this

in patients who report for refraction with eyestrain, and for whom nothing further is done (from the standpoint of convergence defects) in their relationship to the demands of single binocular vision. He discusses his theories of the physiology of single binocular vision as it applies to his subject matter—to illustrate his contention—and then proceeds to an adequately detailed account of the equipment necessary and the technique of the treatment for, and the diagnosis and relief of, convergence defects. The subject is ably presented, as Stutterheim interprets the findings of and treatment for convergence insufficiency, and is well worth careful reading.

—Edmund B. Spaeth, M.D.

Refraction of the Human Eye and Methods of Estimating the Refraction, James Thorington, M.D. Revised and edited by J. Monroe Thorington, M.D. Philadelphia: P. Blakiston's Son & Company, 1939.

Dr. J. Monroe Thorington has prepared a useful and valuable revision of his father's work on refraction. The material is well outlined and a clear and concise explanation of the problems involved in the refraction of the human eye is presented so that the student's mind is not burdened with unnecessary details. The fact that the text is amply illustrated adds to its value as a textbook for students.

The author has confined himself mainly to the practical application of his subject and has only referred to and not discussed certain recent theories and practices related to the field of refraction which might confuse the mind of the reader.

This excellent volume continues to meet the needs of the student of refraction.

—Conrad Berens, M.D.

Principles and Practice of Ophthalmic Surgery, Edmund B. Spaeth, M.D. Philadelphia: Lea & Febiger, 1938.

Dr. Spaeth's book covers the entire field of ophthalmic surgery. It is one of the best books on this subject in the English language. The illustrations are uniformly good and the descriptions of operative procedures are easy to follow.

—Francis H. Adler, M.D.

Etiology of Trachoma, Louis A. Julianelle, Ph.D. New York: The Commonwealth Fund, 1938. 248 p. ill.

Dr. Julianelle's monograph on the etiology of trachoma fills a great need for the compilation of our modern knowledge of trachoma. This volume is an extensive survey of past and present studies and serves as a complete and ready reference for ophthalmologists and those engaged in the study of the causation of trachoma.

The subject is treated under the following headings: trachoma and clinically similar diseases; general considerations on epidemiology; general considerations on etiology; general considerations on infectivity; the microorganisms associated with trachoma; the inclusion body of trachoma; the relation of viruses to trachoma; purification of the infectious agent; cultivability of the infectious agent in tissue culture; properties of the infectious agent; and a general discussion.

The author's complete and detailed bibliography should serve as an invaluable guide for future study in the etiology of trachoma.

—Martin Cohen, M.D.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

303. Prevention of Blindness as Seen by a Commission for the Blind, William E. Bartram. 8 p. 5 cts. Points out the relationship between a commission and the other state health and welfare agencies.

304. Prevention of Blindness as Seen by a Private Agency, John Williams Avirett, 2d. 12 p. 10 cts. Describes a statewide program by a volunteer agency.

305. Prevention of Blindness as Seen by a Social Security Administrator, Gwen Hardin. 12 p. 10 cts. Presents the Social Security Board's responsibility for a prevention of blindness program as it is applied in the State of Washington.

306. Prevention of Blindness as Seen by an Interdepartmental Council, Harry O. Page. 12 p. 10 cts. Describes the co-ordination of health education and welfare departments in a prevention of blindness program.

307. A Medical Social Case Work Approach to the Development of an Eye Health Program, Muriel Gayford. 12 p. 10 cts. Some aspects of an eye health program as it affects the individual.

308. Thirty Years in Saving Sight, Lewis H. Carris. 12 p. 5 cts. Traces the history of the National Society for the Prevention of Blindness from its early activities as a voluntary state agency.

D127. Out-Patient Service in Ophthalmology, Conrad Berens, M.D. Reprinted from *The American Journal of Ophthalmology*, August, 1939. 8 p. 5 cts.

Contributors to This Issue

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Widely known for his activity in the interests of anti-fireworks legislation, **Mr. John Williams Avirett, 2d,** is president of the Maryland Society for the Prevention of Blindness.

Supervisor of the Division for the Blind, **Mrs. Gwen Hardin** is active in the State Department of Social Security, Olympia, Washington.

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From the Social Service Department, Washington University Clinics and Hospital, St. Louis, **Miss Muriel Gayford** writes of the social worker's case work approach.

A practicing ophthalmologist of Chicago, and vice president of the Illinois Society for Prevention of Blindness, **Dr. Harry S. Gradle** is a frequent contributor to The Sight-Saving Review.

Book reviewers: **Drs. Edmund B. Spaeth** and **Francis H. Adler,** ophthalmologists of Philadelphia; **Drs. Martin Cohen** and **Conrad Berens,** ophthalmologists of New York City.

The Sight-Saving Review

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Table of Contents

Advances in Prevention of Blindness and Conservation of Sight—A Summary of Conference Features*

Ira V. Hiscock, Sc.D.

A RUNNING account of the various sessions of the Society's Annual Conference.

AN EDITORIAL in the New York *Times* this morning emphasized the significance of this work for the prevention of blindness, the last two sentences concluding as follows: "Eyes were made for seeing. That is this Society's reason for being." How the vision of leaders protects sight through the practical co-operative application of cumulative scientific knowledge has been evident in the discussions of the Conference. The vision and leadership displayed through the years have come from many sources but I am impressed with the position of the National Society as a voluntary agency co-operating with official national, state, and local bodies as a guide along the pathway which has been cleared over the last 25 years.

Following the early emphasis on ophthalmia neonatorum, we see a gradual evolutionary process to include not alone the prevention of blindness but the protection of eyesight. In this growth we find an inspiration, revealed in the study of the annual reports and the previous conference programs, and in the expressions which have come from such leaders in this organization as Mr. Glenn, Dr. Park Lewis, Mr. Morgan, Mr. Carris, and the present active staff. We see a stimulating body for sound legislation. We find a service headquarters co-operating in the development of procedures, collaborating with many workers, assisting in education and training,

* Presented at the Annual Conference of the National Society for the Prevention of Blindness, New York, October 28, 1939.

and demonstrating opportunities. Here is an educational and interpreting center, with a carefully conceived and ably executed voluntary program stimulating investigation, counseling governmental and voluntary agencies, and serving as a clearinghouse.

Considerable emphasis has been given to nutrition as one of the several important factors relating to the eye. This embraces the protective foods and an understanding of diets in relation to various factors of eye difficulties. Here again we see nutrition becoming increasingly recognized as an important part of public health.

Among other special problems is trachoma. There are some 60,000 cases distributed over the United States in endemic form among native Americans, the foreign born immigrants, certain Asiatic and Mexican groups, the American Indians and even sporadically among city dwellers. The Indian problem is a little different from the rest, varying with the different reservations enormously, of course, from zero among the Seminoles to some 35 per cent among the Navajos. I was struck by the changes which seem to have occurred between the studies being made in some of these areas and previous studies, as well as by the variation by states. Of some 25,000 cases among the Indians, the largest actual numbers are reported in Arizona and New Mexico, with relatively large percentages also in Montana and Wyoming. Among the non-Indian peoples, a group we have not thought so much about, 35,000 cases exist, some 70 per cent being found along the old trail of the early settlers from the Atlantic Seaboard to the junction of the Ohio and the Mississippi Rivers.

When the first trachoma census was made by the U. S. Public Health Service 27 years ago, an infectivity rate of some 69 per cent was reported in Oklahoma. But the percentage for that state is listed as one of the smallest now, although over a third of the cases of blindness in this group are traced to trachoma. Hence a large problem still remains. There is some comfort in the progress reported in treatment from the use of sulfanilamide.

More recognition is properly being given in the industrial field to protecting the eyes of the industrial workers, to industrial eye injuries, to the problem of poisonous substances, to the work of the Federal Government in conserving the sight of the industrial worker not only through assistance in development of codes, but

to those in federal employ including the W.P.A. and C.C.C. groups. We are impressed by the cost of these hazards in the industrial field, but in mentioning cost we need to bear in mind, as the speakers have emphasized, the fact that this cost in dollars and cents is a small part of the whole story. We often find many factors which are a good deal more important than the condition which appeared on the surface. We need to see the whole family picture in relation to the employment status and the community problem.

Because of the intervention of the European war, the medical representative of the Industrial Eye Injuries Committee, Royal Eye Hospital, Mr. Joseph Minton, F.R.C.S., was unable to present in person his discussion on "What Treatment of 7,000 Industrial Eye Injuries Has Taught Us." A brief review of his prepared paper brought out the facts that the high incidence of eye injuries is due to the lack of provision of safety measures by many employers, and the negligence by many workmen in using safety measures when provided. The problem must be tackled by making employers conscious of the necessity for providing safety measures, and by educating workmen and encouraging them to overcome their prejudice against wearing goggles and other protective appliances.

Another speaker referred to increased interest in the work in poisonous gases and chemicals in industry. The New York State Division of Industrial Hygiene, after study, approved last year approximately 2,000 sets of engineering plans for the control of such toxic materials in the New York factories. These poisonous substances are more numerous than some have thought, embracing carbon tetrachloride, carbon monoxide, carbon disulfide, hydrogen sulfide, lead, and many others. That mandatory provision should be made for use of protective devices was proposed, as has been done to protect from other industrial hazards.

In regard to the cost, it is interesting to find that about 8,000 are blind because of eye hazards, and that over 80,000 have lost the sight of one eye. Each year some 75 persons lose the sight of both eyes, with 2,000 losing the sight of one eye. These are large figures, but they do not include the whole story because not so much is said about the thousands who partially lose sight. One of the national organizations feels that perhaps this is a 50 per cent understatement. The National Society for the Prevention of Blindness

once estimated the net cost of the industrial eye injuries at some $50,000,000. They now believe that $100,000,000 would probably come nearer the actual experience. One speaker asserted that 98 per cent of these are needless; they could be prevented if certain provisions were taken. Among the provisions which are needed is the realization by management of prevention factors. That is coming but more slowly than a good many would like to see.

In the second place, there is needed courage and desire to issue administrative orders and follow through to be sure that the plant is physically safe, that there is more education of the workers and supervisors and that there is better co-operation between the workers in the protection and the management of the protection of the worker. Those of us who have visited factories know something about what that problem entails.

Turning to federal participation in some of these industrial factors, it is encouraging to find: (a) development of such groups, for instance, as the committee on adequate lighting in the interdepartmental committee; (b) improvements in illumination conditions; and (c) carefully planned programs for education and promotion of the lines of activity which are known to be worth while. More than half a million pairs of protective goggles have been purchased by the government for the W.P.A. employees over a period of four years, and many thousands for the other groups engaged in those activities where there is a real hazard. The Bureau of Mines has also for some time been giving attention to this problem, while the United States Navy has studied some of these safety factors leading to proposed codes in some instances, and to proposed programs in others.

In the work for preschool children, we find emphasis being given to the importance of knowledge regarding the development of the eye itself and of early supervision of eye muscle control. The key position of the pediatrician in saving sight is one which involves a challenge to those engaged in medical education as well as to organized state and local medical societies, health departments, and other agencies which may serve as channels for increasing insight in regard to the way the general examinations are conducted, the pediatric treatment and what it embraces, the relationships with specialists which have been emphasized so much. Gradually more

people in the field of pediatrics are taking hold of this opportunity.

But with it all, unless we are carrying along a certain amount of education of the parents to be conscious of some of the problems which they might recognize and upon which they should seek assistance, the task is far from completed. Here not only the physician but the public health nurse and the medical social worker, among others, are in a very strategic position.

Effort in this field of sight conservation involves thorough understanding of the patient and of the whole family. There are factors in the emotional adjustment of young children with visual handicaps. In studies of a large group of children supposedly well and normal, 10 per cent of those under school age were found to have serious visual handicaps. Habits and attitudes, important in relation to later life, may be formed unless those problems are recognized by observing and understanding parents. The child, of course, is not at the age and position to explain, and sometimes we find a nagging parent who does not understand these problems which have such a significant after-effect.

Much assistance may be given in dealing with these problems by the medical social worker and the public health nurse in securing early discovery and early correction. Skill in understanding the child and in interpretation is needed both with the child and with the parent. This is a co-operative enterprise. In the adjustment of these children with the temporary eye difficulties and in the emotional adjustment of the school-age children, we are concerned not only with the age when the difficulty occurs but when the treatment begins, and with the training of the child and the emotional situation in the home. This is an excellent example of factors which may lie back of the initial problem which presents itself before us in the clinic or in the office or in the home.

Sometimes the problem may cause a sense of inferiority or disgrace and aggravate the child's reactions. Here the physician, the teacher, the nurse, the medical social worker may greatly help in meeting this problem of handicapped children in their adjustment to the whole situation. A home free from friction and emotional strain, of course, is what is desired in addition to the immediate help which may be given. The teacher, who is with the school-age

child so much probably occupies a more significant position than any of these other workers in handling some of these very important problems.

In the field of sight-saving classwork, interesting demonstrations of mechanical devices were conducted during the Conference, using typewriter-dictaphone combinations for teaching purposes. One of the able participants was a boy with a marked visional handicap who, however, seemed to have security built on long-term training and experience with people in whom he had confidence. The effective use of the radio in Cleveland was also illustrated.

Personal and group responsibility and initiative are most constructive forces in any public health endeavor and it certainly is true in this specialized field of sight conservation. The governmental and the private agencies can help to make this responsibility an effective force through proper organization, proper planning and effort; both understanding and desire, of course, are necessary. Six persons and groups were suggested as being in key positions in regard to this question of responsibility. Three of these key positions relate to individuals and three to agencies. First, the practicing physician. In the search for and treatment of syphilis, particularly with emphasis on the expectant mothers; in the prophylaxis of the newborn, in the knowledge which is sufficient not only to recognize a situation but to recognize one's limitations in case it is necessary to refer a patient to a specialist for further study and care, the physician holds an important place. The speaker said that a proper performance would prevent 60 per cent of the blindness. In the second place is the individual citizen in the community—a person who is interested and willing to participate; and in the third place is the citizen as a parent.

There are many public and private agencies involved. We must utilize our resources to the best advantage. Unless these forces work together closely, rather than in water-tight compartments, or alone in separate channels, we are not going to keep in mind our chief aim, the fact that we are working with a child and with a family.

The state medical societies have taken a hand in supporting sight conservation. The Indiana State Medical Society is one illustration described at the Conference. It believes in the national pro-

gram of the American Medical Association, which was adopted in San Francisco. We are familiar with the excellent radio programs and the material which can be obtained from that source and used by local and state medical societies, over and above the information contained in such publications as *Hygeia* and a good many pamphlets and reprints. The Indiana State Medical *Journal* is used as a central forum, and speakers are furnished to help in both the lay and the professional programs. The state supervising ophthalmologists are among other professional groups becoming increasingly active.

With this co-operation of the medical, the public health, the educational, and the welfare groups, there is increased recognition of so much that can be done. Increased training of the professional worker is being emphasized. A good deal of time in this Conference, for example, was given to the training of the public health nurse. In developing standard qualifications of personnel, the public health nurses have been leaders. The nurses point out that there is not so much training in some of the schools of nursing as might be desirable in regard to the need for correlation of eye health with other phases of their program, and considering not only what to teach the students but how that instruction is actually applied by the individual concerned. The value of the generalized public health nursing program with specialized consultants was also stressed.

The health department should play an essential rôle in this program. As we consider the different activities carried on by the modern health departments with their staffs of physicians and public health nurses, and sometimes with medical social workers, we note the laws which require the use of drops in the newborn babies' eyes, and which provide for premarital and prenatal blood examinations. Some of the physicians who spoke on this program were rather critical of the enforcement of some of those laws, and indicated that there is something to be done in some states in addition to the adoption of new legislation.

In New York City, if a case is found, the health department takes the laboratory specimens of the discharge, and provides for isolation, for twenty-four hour nursing service, and for medical supervision of the patient. We need to be sure that our community

through the health department or hospital service has the kind of facilities which provide prenatal care and prenatal clinics, school health programs with effective examination, and follow-up service. In regard to trachoma, the eye clinics in New York City are not so busy as they were back in 1909. But there is still need in the venereal disease clinic for the physician who has special knowledge of eye conditions. There is still need for the kind of examination which will detect these conditions. With all of these provisions as keys which will help to unlock a good many of the doors to these problems, a well-organized health education program which is comprehensive in scope is needed to disseminate information. There is a great deal of source material which can be obtained without great expense, in addition to the consulting service which is available. In all of these activities, there must be teamwork of the kind which is so well illustrated in the program of the National Society for the Prevention of Blindness.

A Survey of Illumination in Selected College Buildings

Louis M. Hickernell, M.D.

DISCUSSES lighting conditions in study rooms, libraries, laboratories and classrooms of a number of colleges, and presents practical recommendations for lighting standards.

THE relationship between adequate illumination and eye comfort has been given much consideration during recent years. Illumination in the home, in industry and elsewhere has received its share of attention. College students comprise a special group for whom it is felt that adequate illumination has a special significance by reason of the constant use of the eyes in reading and study. In 1936 the National Society for the Prevention of Blindness suggested to the New York State Branch of the American Student Health Association that a survey of lighting facilities in typical institutions represented in that group might contribute valuable data as to existing lighting conditions. The author was named as chairman of such a survey committee. This report is a summary of some of the findings.

Four universities contribute to the data submitted in this survey. They are Colgate, Cornell, Rochester and Syracuse. A total of 89 representative rooms is discussed, each of which was measured according to standard instructions provided to these institutions when they expressed their willingness to co-operate in the survey.

The data gathered for the survey were tabulated upon special survey sheets which are a modification of the one used by the Illuminating Engineering Society committee in its original survey conducted by members located at colleges throughout the United States.

One standard form was designed for each of the four types of rooms examined: the library, the laboratory, the classroom, and

the study room. Uniform data sheets were used in the various colleges to insure comparable results.

The data indicated for the survey of a classroom were recorded under the following headings, each of which was further subdivided: plan of room, color, and reflection factor of walls and ceiling in per cent; blackboards; windows; shades; lighting units; sources of glare; horizontal illumination; and range of foot-candles on work. The data noted for the study room evaluation were similar. One extra heading for a laboratory room listed questions as to work placed with a minimum of ten foot-candles for microscope use, dissection, chemical tests, and physics experiments. Special features in the library survey blank concerned the fixtures for general lighting and table lamps.

Numerous factors enter into the consideration of whether or not a room is adequately lighted. No single feature, but rather the combination of the entire equipment and plan of a room including size, arrangement, exposure, wall color, lighting fixtures, and purpose for which the room is used—all figure in the judgment of the adequacy of the light within a given room. In surveying dormitory rooms where studying is done, for example, 68 different features of each room were examined in an attempt to make an accurate evaluation of its status.

Lighting of Dormitory Study Rooms

As we summarize the results of the investigations of the 40 study rooms which have been here reported, these conclusions appear most significant:

1. All but one room had 50 foot-candles of light at the window, and out of the 36 rooms where daylight could be measured for a natural daytime condition, 26 were measured on sunny days. These measures then are presenting 72 per cent of the rooms under better-than-average daylight conditions.

2. Ceilings generally rated above 70 per cent in their ability to reflect light.

3. Only three rooms were judged below 50 per cent in wall reflection power.

4. Seventy-six per cent of the rooms had ceiling lights, all of which were direct luminaires.

5. Thirty-three rooms had a total of 66 lamps. The lamps were so distributed that 20 per cent of the total were found in rooms where there was but the one lamp; 33 per cent were in rooms where two lamps could be found; 33 per cent were in rooms where there were three lamps and the remaining two rooms each had five lamps in the room, ten lamps which constituted approximately 16 per cent of the total lamps found.

6. Seventy-one per cent of the lamps were three and one-half feet from the floor.

7. Forty-two per cent of the lamps contained 40-watt bulbs, and 27 per cent had 60-watt bulbs.

8. Only seven lamps out of the total 66 were indirect.

9. In regard to artificial lighting in dormitory study rooms it was found that 85 per cent had a minimum of five foot-candles or less of lighting on their work surfaces. Twelve per cent had as their maximum lighting ten foot-candles or 'ess.

10. When the minimum desk places showing five foot-candles or under were totalled for the daylight readings, 53 per cent were found to be below this measure. When the measures among the maximum daylight readings under ten foot-candles were computed, it was found that 20 per cent of these readings came under the ten foot-candle measure.

11. Eighty-four per cent of the study rooms had one-half of the room area getting ten foot-candles of daylight illumination.

Interpretation of Results.—The illuminations found in the study rooms, even when measured on sunny days and near the noon hour, indicate that dormitory lighting conditions are generally inadequate. In the daylight readings half of the minimum measures proved to be amounts of light unsuited to desk work. One-fifth of the maximum daylight illuminations came under the headings of ten or fewer foot-candles. Some observations made during the survey indicate reasons for ineffective lighting conditions and suggest possible changes.

Room arrangements are subject to the students' own whims. Often the situation was found in which the desk had been placed at the window, but frequently it ran parallel to the window and not at right angles, which is preferable. When the desk can be arranged so that the light will fall across it from the left, for the

Figure 1.—Study room lighting for one person. Student is right-handed, so lamp is placed at left and just behind her shoulder line.

Figure 2.—Study room lighting for two persons, where lack of space necessitates staggered use of desk. Each student receives adequate light; light source is so located that each is protected from glare; and a large surface of ceiling is well lighted, thus providing good diffusion and good general illumination.

right-handed person, no shadow will fall on the paper during writing at the desk. Also he will not face directly the glass windowpane. In some instances students had arranged their furniture with no apparent concern for the light source in the room, the desks being in corners opposite the windows. Here often students were found working in their own shadows. This inefficient use of natural light can usually be counteracted by instructions to the student on how to arrange furniture so that the best advantage of the illumination from the window will be received.

A further simple suggestion to students is that they learn to give attention to the window shades in their rooms. The greater part of the light admitted to a room comes from the upper pane. In fact, doubling the height of the window multiplies by three the intensity of light at the far side of the room. Most frequently in students' rooms the shade was drawn to cover the upper pane completely. The custom which has fostered this habit should give way to the more efficient practice of pulling the shade only a short distance, if any, from the top of the window. It is better still to have two shades, both attached at the middle of the window, one rolling upward, the other down. A translucent shade that is light in color is to be preferred to a dark one, so that at times when sunlight is streaming into the room the shade can be drawn, not to exclude the light but to diffuse it through the room area with absence of glare.

Arrangements should be made by the student so that heavy, light-excluding drapes can be easily pinned or tied back from the pane. Also the condition of the windowpane itself needs periodic attention. An accumulation of dust and dirt on a windowpane serves to filter out light noticeably. Here, as with shades, maintenance officials may directly aid in increasing the amount of light present in study rooms.

The artificial lighting also was found in many cases to be inadequate in its minimum figures, and on this account to be serving the student badly. When 85 per cent of the minimum figures on desk surfaces are under five foot-candles and 12 per cent of the maximum under ten foot-candles, there is bound to be a resultant eyestrain to the users of the desks in connection with prolonged study. To the type of desk lamp, and the size of the bulb used in it, can be

attributed the extreme "spottiness" of the illumination on many desk surfaces. Only seven of the lamps seen were of the indirect type which insures diffusion of light and a more even distribution of it. While a 100- or 150-watt bulb is necessary in these lamps, the lessening of eyestrain which results makes it a much more desirable type of lighting fixture than the common 40-watt direct lamps.

These desk lamps which the students use are purchased by them. In several instances the low table lamps which they have provided are much more decorative than useful. In these cases especially the glare is localized in the center of the desk, and frequently it is re-directed to the students' eyes. Often the light bulb itself is visible, an undesirable feature from the standpoint of comfortable lighting. A small lamp of this sort might be permitted on a dresser where it is less constantly used, but it is not suited to a student's needs on a desk. Most students seem to have procured their lamps without any concern as to the kind of lighting that would result. Also they seem generally uninformed as to what should constitute good light. In one instance when a freshman girl was asked about the way in which she adjusted her small orchid boudoir lamp which she used for studying, she naïvely replied, "The light from it is so dim that I take the shade off completely when I read."

The plan in operation in one college is worthy of consideration. There the students are advised to plan especially for the conservation of their eyesight. For that third of the student body who live in sorority, fraternity, and rooming houses the matter is well solved by a demand on the part of the administration that the rooms be equipped with the I.E.S. indirect type of lamp. For the rest of the student body a wholesome campaign has been launched to inform students of what adequate lighting is. "The outstanding feature of the program included the co-operation of the deans and their respective student organizations at registration time at the opening of the present term, in placing in the hands of every student a copy of the pamphlet, *Your Eyes*, published by the Cleveland Sight Saving Council, together with a supplement devoted to the proper arrangement of study rooms with their desks and lighting equipment." *

* F. A. Kartak, "The Lighting of Students' Study Rooms," *The American School Board Journal,* February, 1937, p. 23.

Just as these measures have brought about improved conditions at this school, they could be similarly used in other places. Ultimately perhaps the goal would be the equipment of all rooms with I.E.S. indirect lamps. If this installation is too costly on the part of the administration or the householders, the next best step toward adequate illumination would be to arrange for definite and constructive information about the value of various lamps com-

Figure 3.—Position of lamp in a double room with desks arranged for two right-handed students. As in Figure 2, the students are receiving adequate, well-diffused illumination, and are protected from direct glare by the arrangement of desk and lamp which keeps the light source behind the left shoulder of each.

monly used by students. Those now enrolled show a general lack of understanding as to how their lighting problems can be solved, and could be helped toward a more efficient utilization of existing facilities. Entering students should certainly be told in advance of their arrival that they must furnish study lamps and that the care with which they select their lamps is well worth the time and effort so spent. Although the I.E.S. lamps may have a higher initial cost than the others, the students should be convinced that if they are bought early in the college course and used during the following

years, the annual cost is not prohibitive and the investment repays itself many times in increased eye comfort.

To the university authorities falls the responsibility for making the necessary arrangements for the increased wattage which will be consumed. In old buildings where the wiring was provided to fit former and lower standards of illumination, re-wiring may be necessary. The administration cannot be spared this obligation when it is important to the welfare of its students.

It is highly recommended then that an informative campaign be launched to help improve existing conditions, and that information as to the importance of lighting equipment be put into the hands of entering students.

Practical suggestions, simple in their arrangement and sound in principle, may be distributed in the form of a pamphlet called "Lighting of Study Rooms." Some descriptions of glare, shadows, contrast, and other objectionable features are given, and constructive principles explained. Removal of the source of the artificial light from the field of vision is stressed, and the use of the drop light and gooseneck lamp is discouraged. Instead a diffusion reflector type of lamp is advised. Room arrangements which illustrate the best use of light sources are suggested in contrast to those making poor use of them.

It is of interest at this time to quote the qualifications enumerated for the proper sort of student lamp: (1) Height of bulb from floor, 60 inches; (2) light bulb, 150 watts; (3) glare-reducing bowl, diameter 10 inches; (4) shade, top diameter 10 inches and bottom 24–26 inches, with a depth of 14 inches; (5) base, weighted to prevent tipping; (6) a standard that is firm and strong and which maintains a vertical position.

Lighting of Libraries

Twelve library rooms, five of which were in Syracuse University, were examined. The measure of the range of light upon the library tables during the evening study hours disclosed that 92 per cent of the library study rooms had five or fewer foot-candles at some of the seats. While these were the minimum figures found, the high percentage points out a general unfavorable condition. The range of the maximum readings is from two to 40. These readings on the

light meter showed over half of the maximum lighting to be under eight foot-candles. Only five of the 12 rooms had more than the desired ten foot-candle standard in their best locations.

In other types of rooms where a varied sort of activity is carried on, such low figures might be partially excused. In these library rooms, however, only close work is done. With such low illumination provided, eyestrain is bound to result. The fixtures here are permanent and allow for no accommodation to the individual student. Also it is obvious that during the evening no light from any natural source can be obtained to augment the artificial supply.

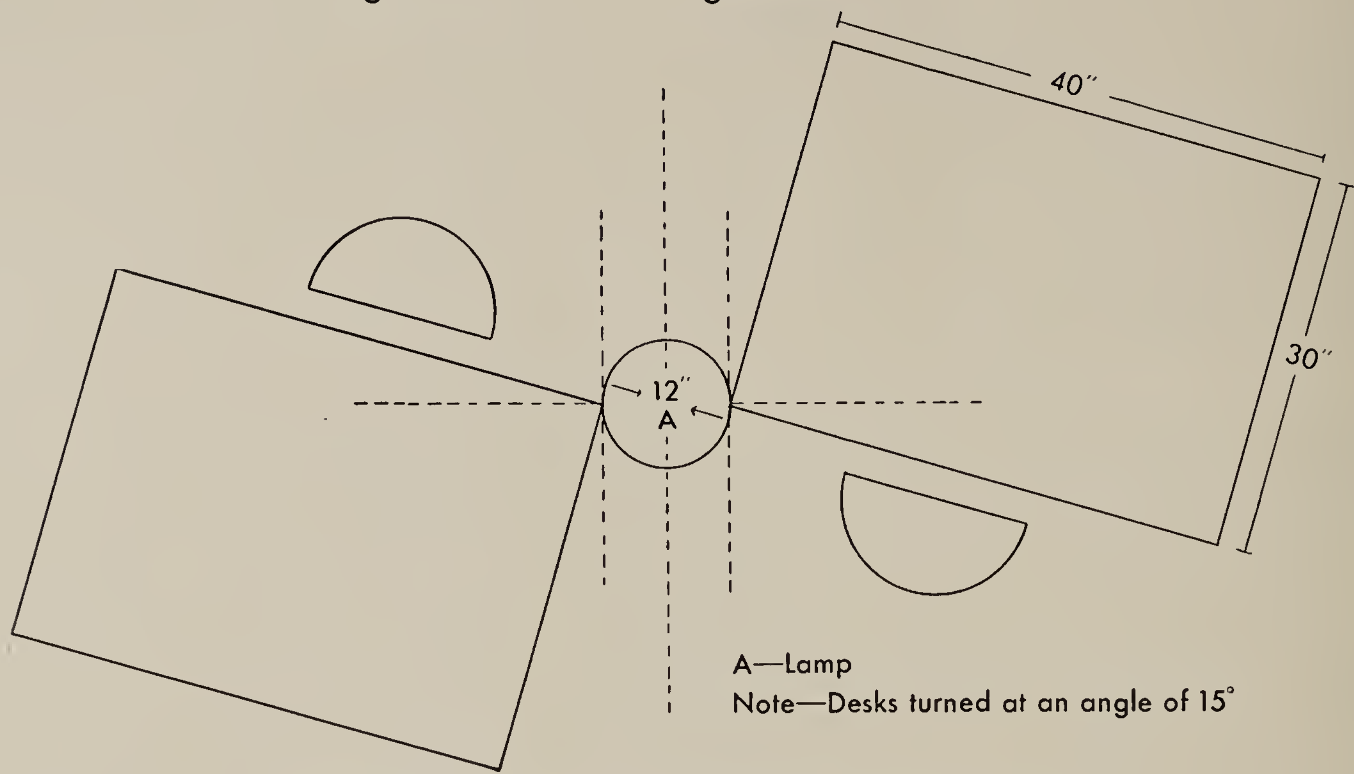
The daylight illumination figures have the advantage that there is always the possibility of adding the supply of artificial light to them. Measures of daylight intensities show that in three of the 12 rooms no part of the area received the desired minimum of ten foot-candles. Five of the 12 rooms had between 20 and 50 per cent of their areas meeting the ten foot-candle minimum. The remaining four rooms had above 55 per cent of their areas lighted to ten foot-candles, one of these being a large reading room with a skylight. When this room was measured at noon on a favorable day, it showed all of its area to have at least ten foot-candles of light.

In addition to the table illumination, that on files and stacks was noted for the rooms where these existed. Of six files measured, none had artificial illumination above ten foot-candles, and only two had daytime light above this figure. Of the ten stacks measured, one minimum daylight figure and seven maximum figures were above ten foot-candles. Of all the other figures, only one was above five.

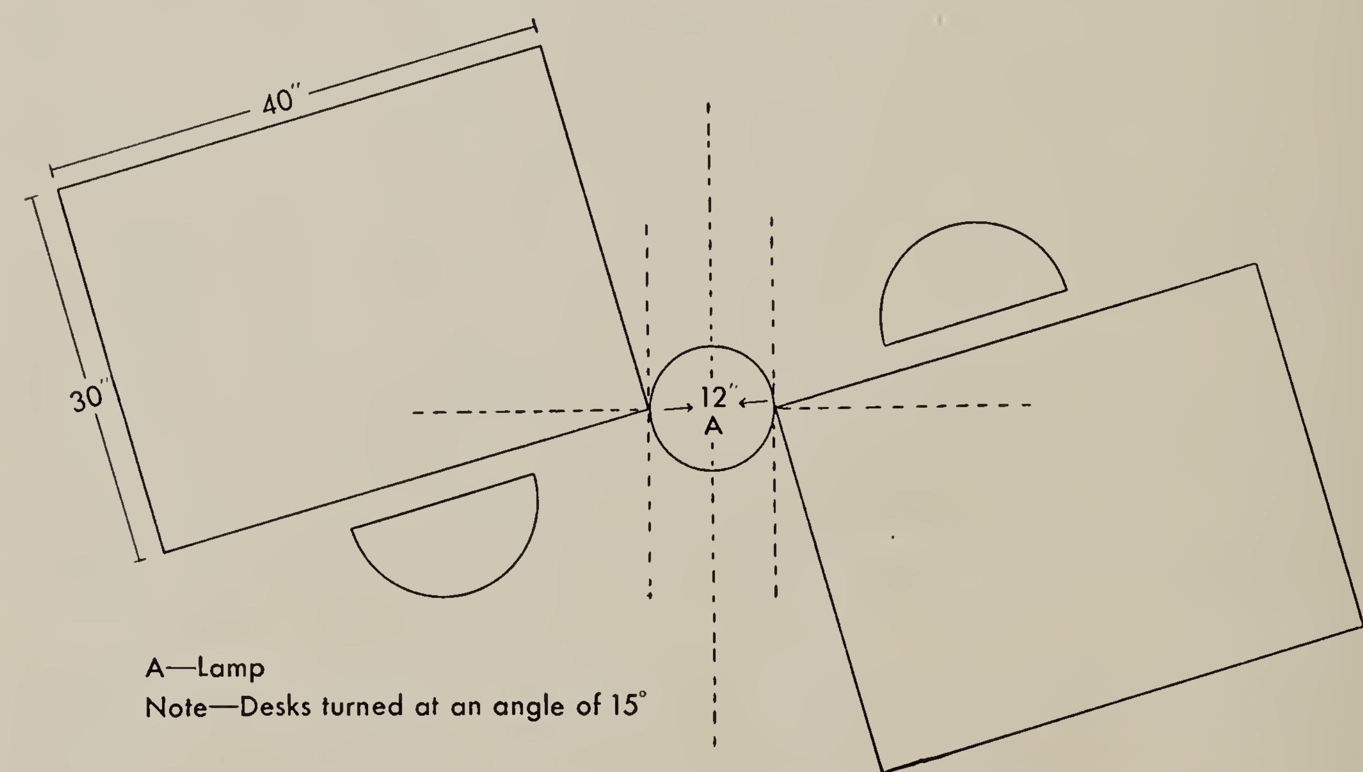
In regard to the other features which constitute good lighting, the library rooms in general had ceilings and walls which were high in their ability to reflect light; shades were usually provided; and room arrangements and lighting fixtures constituted frequent sources of glare.

Briefly then, the library lighting conditions, as shown by the examination of the 12 library rooms in three colleges, are generally inadequate. The daylight minimum on the study surfaces in half the cases is three foot-candles or less, while the minimum under artificial light shows 92 per cent of the library study rooms to be at five foot-candles and below. The maximum artificial shows only

Arrangement for Two Right-handed Students



Arrangement for Two Left-handed Students



Arrangement for Two Students—One Left-handed

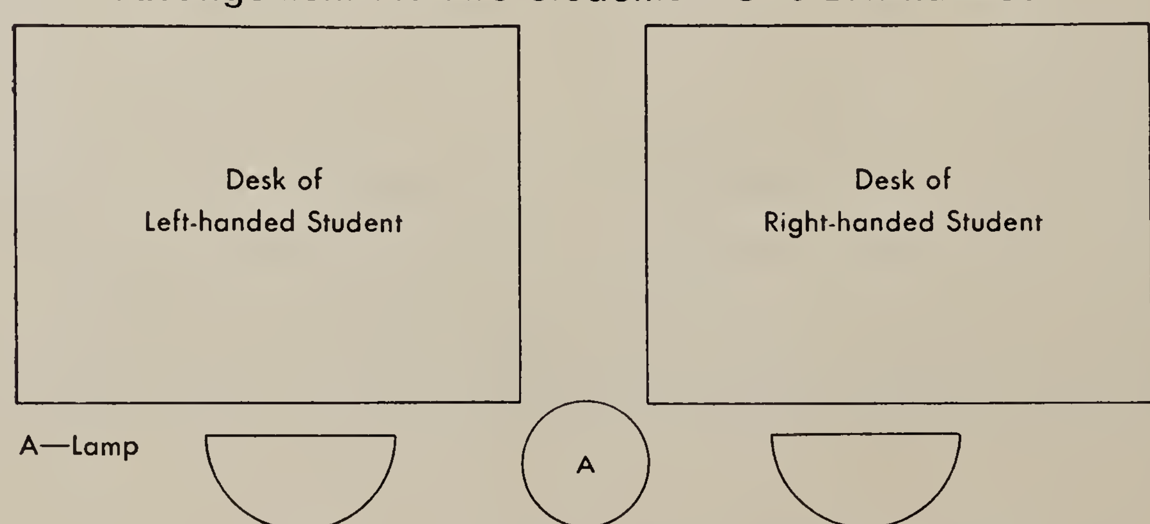


Figure 4.—Correct Desk and Lamp Arrangements

five of the 12 rooms to be above the standard in their best locations. Glare also is frequent.

The responsibility for poor facilities lies directly with the administration officials. Students who are obliged to do reading assignments in these rooms are being forced to study under conditions inviting eyestrain. It is to the administrative authorities that we must appeal for improvement of the inadequate facilities.

Lighting of Laboratories

The laboratory surveys showed that most of these rooms had less than half of their working space suitably lighted for the close work done during the daytime. The minimum daylight illuminations in the 12 rooms examined showed one-fourth of the rooms as having one foot-candle at their poorest location, one-third with two foot-candles, and one-fourth with four foot-candles. All maximum daylight figures ranged upward from 20 foot-candles, with half the rooms having their maximum falling in the 20 to 30 foot-candle range.

Minimum readings under artificial illumination are of one and two foot-candles, with the exception of one laboratory where no reading of less than three was found. Three rooms had only two foot-candles of light in their brightest spots at night. Seven of the 12 rooms had a high figure of six foot-candles at night with full artificial illumination.

When the measures of intensity upon the working places within the laboratories were considered, one-half of the rooms had between 10 and 33 per cent of their desk places lighted to the intensity of ten foot-candles. The remaining half ranged from 36 to 72 per cent of the total working places in the room with illumination of ten foot-candles. A total of 84 per cent of the laboratories had from ten to 50 per cent of their working places lighted up to the desired standard. On the basis of these figures it can be said that most of the laboratories have less than half of their working space suitably lighted for the close work done during the daytime. In only one instance is there a maximum night illumination of over ten foot-candles. Eighty-three per cent of the working areas had six or fewer foot-candles for night illumination. Nine of the days were partly cloudy and three bright, and yet the average maximum

light available was 32 foot-candles. The minimum artificial lighting figures are entirely too low, and the maximum figures are hardly better. Ceiling and wall conditions failed to serve as good light-reflecting surfaces. Shades are lacking at most windows. Variation in light intensities showed lack of diffusion, and direct lighting fixtures were uniformly found. In the laboratory situations again the administration is failing to supply adequate lighting facilities to the students it serves.

Lighting of Classrooms

In summarizing the results of the classroom surveys it is observed that a variety of sizes of rooms, kinds of days, time for study, and the like were used, so that a wide sampling of conditions under which classes are taught is represented. Shiny surfaces created glare in several instances. Window shades were usually provided, although many were of dark filled material which could not aid in providing diffusion of light. Reflection power of the walls and ceilings was generally high.

The type of ceiling unit was superior to those found in other types of rooms, 60 per cent of these rooms having indirect and semi-indirect lighting. The 50 per cent figure found for the minimum numbers of working surfaces of one and two foot-candles only was by far too high a figure, and both natural and artificial light showed this high percentage for the minimum readings. Maximum daylight readings on desks were more satisfactory, all but two being above ten foot-candles. Maximum night readings exceeded ten foot-candles in only four places, but since it is true that these rooms are used chiefly in the daytime, this inadequacy seems less important. As for the daylight which is present throughout the room, fewer than half of the classrooms had half their surfaces lighted up to ten foot-candles.

In this connection a well-planned layout for a typical classroom is cited in Figure 5. It has been approved by the American Standards Association for rooms of dimensions within the ranges indicated and having a ceiling height in the neighborhood of 12 feet.

Together with this plan the operating foot-candles that will be provided in the room are given. The figures in Table I indicate the approximate foot-candles which may be expected from each of the

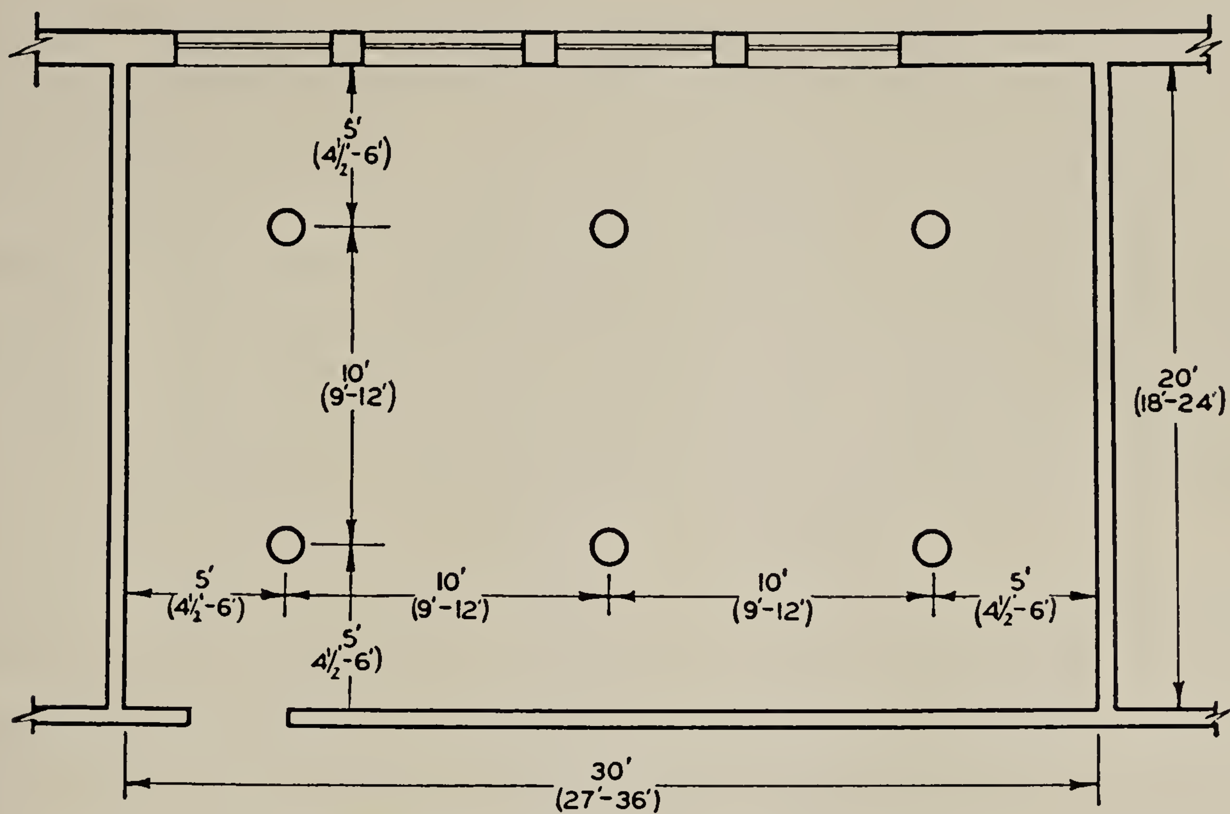


Figure 5.—A lighting layout for a typical classroom, with a ceiling height of about 12 feet, and with dimensions in the range indicated.*

TABLE I *

Type of Lighting	Size of Lamps (Watts)	Room Dimensions 18' x 27'	20' x 30'	24' x 36'
Indirect	300	12	9	7
	500	21	16	13
	750	31	25	19
	1,000	44	35	27
Semi-indirect	300	13	10	8
	500	23	18	15
	750	34	28	22
	1,000	49	39	32
General diffuse (enclosing globes)	200	11	9	7
	300	18	14	11

* Reprinted, with permission, from *American Recommended Practice of School Lighting*, Illuminating Engineering Society and American Institute of Architects, 1938, p. 30.

three types of lighting systems noted when lamps of the wattage shown are used at each of the outlets in a lighting arrangement corresponding to the layout in Figure 5.

Table I also serves to point out the effect of room dimensions on

resultant illumination. Naturally, if a given quantity of light must be spread out over a larger area, a lower illumination will result than if the same light is utilized in a smaller area. The three combinations of room dimensions shown are not intended to be typical of all kinds of schoolrooms but they represent the maximum, average and minimum areas in which the lighting layout in Figure 2 applies. The relative efficiency of the three lighting systems is also shown. Though less illumination is provided by the indirect and semi-indirect, the quality of light obtained compensates.

Conclusions

Of the total of 89 rooms reported in this study, each is different from the other in many details. No single plan or ideal was suggested as the arrangement which must exist in a room to provide that room with adequate lighting. Instead, in each case the structure and plan of the room itself must first be considered, and then to this setting must be added an evaluation of the light there present as it is judged according to intensity, diffusion, glare, wall color and reflection power, lighting fixtures, shades, and the like.

One standard only was accepted and uniformly applied to all rooms, that of the ten foot-candle intensity, which was here accepted as the desired intensity for college students' use.* Through the use of the foot-candle meter which can be placed upon the working surface and record the intensity reaching that place, it is possible to obtain an objective measure. No attempt is made to say how much or what kind of damage is done by inadequate lighting, but we are attempting to say that inadequate lighting might produce a definite threat to eye health.

Classrooms.—When the classrooms were considered in terms of the ten foot-candle standard, it was found that 40, 23, 58, and 37 per cents were the average per cents of the room areas so lighted by day in the four institutions. By actual count, fewer than half of the classrooms had half their working surfaces lighted up to ten foot-candles. Three of the colleges had no artificial illumination

* Since this study was made, the ten foot-candle standard of lighting has been changed by the Illuminating Engineering Society to fifteen foot-candles. See "American Recommended Practice of School Lighting," prepared under the joint sponsorship of the Illuminating Engineering Society and the American Institute of Architects, and approved by the American Standards Association.

which approached the standard throughout a room's area. In one college only was the night light adequate, and this in but 11 per cent of the total area.

Study Rooms.—For study rooms the average per cent of the room area which was lighted by day to ten foot-candles was 80 in one college and 30 in another. The combined natural plus artificial illumination measured in one college showed 26 per cent of the room areas lighted to this intensity in the combined light. Expressed in another way, 84 per cent of the study rooms had one-half of their area getting ten foot-candles of light.

Artificial illumination of ten foot-candles was present in 40 and 15 per cents respectively of the study room areas of two colleges.

Library Rooms.—Among the three library rooms, one from each college reporting, were rooms selected as representative and comparable. Considered in terms of per cents of the areas lighted to this standard, 66, 28, and 37 were the figures found by day. One room had 22 per cent of its surface with this intensity at night.

Dropping the average per cents and considering the range of light on all of the library tables, we find that 92 per cent of all the study rooms had five or fewer foot-candles as their lowest intensity under artificial light. The brightest intensities under night light showed only five of the 12 rooms above the desired ten foot-candle measure in their best locations. Daytime readings showed three of the 12 rooms with no part of their area having ten foot-candles. Five rooms had between 20 and 50 per cent of their areas meeting the standard.

Laboratories.—Two colleges gave laboratory figures which could be averaged for the amount of floor area lighted to the standard. They showed 47 and 33 per cents of the floor area so lighted. Only one per cent of the room area of one college had artificial light throughout measuring to ten foot-candles. This per cent is so small that its effect on the eye health of the whole group of students considered in these colleges is lost when it is compared to the almost entire lack of adequate lighting noted.

Expressed in other words, most of the laboratories had less than half of their working space suitably lighted for the close work done during the daytime. Eighty-four per cent had from ten to 50 per cent of their work places lighted to the standard.

Summary

Daylight illumination may thus be said to be inadequate in all of the types of rooms considered. Night illumination rarely reaches the standard except where the study rooms in two colleges averaged 40 and 15 per cents of the total floor areas so lighted.

Even where a fair percentage of the rooms approached the standard in intensity of illumination, the other factors of illumination such as reflection power of the walls and ceilings, lack of proper diffusion, wide range in intensity, and glare factors especially, frequently tended to detract from the adequacy of the illumination.

Several general conclusions can be drawn from this study, among which are the following:

1. Judged by the ten foot-candle standard, the illumination intensities in the buildings of the colleges studied are generally low.
2. The light intensities within the rooms are very uneven, permitting contrasts in the amounts of light.
3. Glare factors exist frequently.
4. The types of window shades found generally do not permit diffusion of natural light into the rooms.
5. The amount of light reflected from the walls could be improved by painting in approved colors which have higher color and reflection factors.
6. The best use of electric current is not being made due to the types of fixtures provided.
7. The best use of natural lighting is not being made.

The implications to be drawn from these investigations are:

1. That no one standard for the lighting of a room can be set up. Each room provides its specific illumination problems, with orientation, location, and use affecting the lighting requirements it must meet. Measurement by the use of the light meter is a practical means of getting an objective estimate of the light falling upon a given surface;
2. That it seems likely that no work is being done to any appreciable extent to acquaint the student with the fundamentals of good lighting, either natural or artificial, or to aid him in making the best possible use of available facilities;
3. That college administrators of the colleges studied who are in

charge of the buildings where students are taught and housed have not provided the facilities for adequate lighting;

4. That not only intensities of light, but the causes and prevention of glare, would be emphasized in informing students of ways of obtaining adequate lighting.

In final summation, the following description by Dr. John F. Gipner of Rochester seems especially pertinent, since it reflects ophthalmologic opinion on the subject of illumination facilities for college students:

> "This subject is most interesting to me as an ophthalmologist, for it is an exhaustive and complete analysis of the conditions of lighting under which the university student works. It has been prepared under the direction and guidance of a lay organization which has always been an ethical and true friend of American ophthalmology—namely, the National Society for the Prevention of Blindness. The result is that ophthalmologists will welcome the findings of this unprejudiced study and report, and will wholeheartedly support the New York Student Health Association in its efforts to better the lighting of students' study rooms, both at home and on the campus.
>
> "Ophthalmologists have long recognized the need for better illumination of homes, offices and schools, but being conservatives, and not publicity-minded, they have hesitated from joining in with electric power companies' publicity programs to sponsor and popularize the increased illumination. They have refused to accept the tests on patients of the Better Light—Better Sight program which seemed to indicate that much higher intensities of illumination than those at present commonly employed were necessary for good seeing. This test, as you know, runs from 20 foot-candles upward. The test is said to prove that:
>
> "1. Over a wide range of possible intensities, there is a critical small range in which acuity is at its optimum.
>
> "2. That the maximum acuity occurs at a high intensity.
>
> "3. That the range of intensities which produce an observable change is large.
>
> "Dr. E. J. Ludvigh of the Harvard Howe Laboratory for Research in Ophthalmology, in a recent paper, shows that these conclusions are in conflict with König's, which were written in 1897 and which have been consistently confirmed. König showed that:

"1. A change of intensity of over 10,000,000 to 1 results in a change in acuity of only approximately 20 to 1.

"2. That practically no increase of acuity results from raising the light intensity above 16 foot-candles.

"Ludvigh found that the Better Light—Better Sight test failed to let the eye adapt itself to light, and that the varied brightness of the field produced pupillary changes which prevented dilation of the pupil for the lower intensities of illumination. He states that the test is designed to, or happens to, provide an almost minimal gradient of retinal excitation per unit of intensity, conditions to which the eyes are never subjected in ordinary reading.

"Dr. Hickernell concludes that students' rooms should be equipped with I.E.S. lamps, and that university authorities should arrange for the necessary increased wattage. Marquette University already supplies a proper light fixture as well as the current. The University of Illinois now allows each student 100 watts of current. Measures such as these should be sought by the New York State Student Health Association in recommending adequate illumination for students' study rooms.

"In what way are eyes damaged by insufficient illumination? In an effort to see more clearly, the accommodation is strained with the result that fatigue ensues. Normal eyes and low degrees of hyperopia may become myopic from continued overwork. Some astigmatic eyes may also show a progression toward myopia, and myopic eyes become progressively worse. The strain upon the eyes can be relieved partly by glasses to correct the ametropia or error of refraction, but even with correcting lenses, the eyes are subject to future strain if the illumination remains improper.

"It would seem that this association has now adequate information to go before the boards of control of the constituent universities and demand programs for effective lighting on the campus and in the students' study rooms. Such action will afford effective prophylaxis to much of the present eyestrain and progressive degeneration of students' eyes while residents in the university. The knowledge of adequate lighting acquired by the student will be disseminated throughout the various communities and help the National Society for the Prevention of Blindness in its noble effort to save eyesight for more and more people."

Recommendations

Recommendations which follow from the results of the survey are:

1. Since the library rooms are in almost constant use during both day and night, they should be adequately lighted.

2. While no measure has been made of the existing power lines, it is generally admitted that the additional current necessary may not be carried by these lines. The obsolete buildings will have to be revamped if they are to meet the current standards of proper lighting. The libraries are recommended to be first to receive these changes.

Suggestions for those interested in the welfare and improvement of eye health among students for further investigations might be:

1. Studies to consider foot-candle standards to determine which meets the demands of students most hygienically;

2. Studies to investigate the causes of eyestrain among students;

3. Experimental studies of various sorts, an example of which might be the study of a control group working under improved conditions of lighting to watch their eyestrain as against that of a group with average unselected equipment;

4. Surveys in other universities to measure the conditions generally existing for student seeing.

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Trachoma Control in the Indian Service*

J. G. Townsend, M.D.

A DRAMATIC account of the use of sulfanilamide in the control of trachoma among Indians.

THE Office of Indian Affairs, more than any other branch of the federal government, has faced the realities of trachoma. Just how long the North American Indian has been afflicted with the disease is not definitely known. It has been thought that the Conquistadores who entered New Mexico with Coronado in 1534 first introduced it. Early accounts (and mostly lay accounts) from the reports of trappers, explorers, traders, and the Jesuit Fathers, do not list the disease among those frequently alluded to in these old reports as being common, except for the occasional term of "bad eyes," "sore eyes," "scrofulous eyes," which may or may not have meant trachoma.

The first effort to attempt a trachoma census was in 1912, when the U. S. Public Health Service undertook a complete survey of the Indian population. All the states where Indians resided were visited, and a total of 39,231 Indians were examined. Of this number, 8,940, or 22.7 per cent, were found to be infected, the degree of infectivity varying from 68.7 per cent in Oklahoma to none in Florida.

Dr. Harry S. Gradle, trachoma consultant for the Indian Medical Service, has made a rough approximation of the total number of trachoma cases among the non-Indian population of the United States. Based on morbidity statistics in the Public Health Service, from the number of new cases discovered throughout the years in the trachoma clinics of southern Illinois, and from the number of blind persons in the United States, he has estimated approximately

* Presented at the Annual Conference of the National Society for the Prevention of Blindness, October 28, 1939.

33,800 cases of trachoma among non-Indians in this country. Comparing this figure with the approximate number of cases among Indians may be done by general estimates. The incidence of trachoma among Indians, by states, may be given as follows:

Oklahoma* and Kansas	Less than 2%	1,975
North Carolina	Less than 2%	67
Florida	0%	0
Minnesota and Wisconsin	4%	1,135
North and South Dakota	8%	3,139
Wyoming	18%	419
Montana	22%	3,595
Oregon and Washington	4%	739
Idaho	10%	42
California	Less than 2%	472
Nevada	8%	429
Utah and Colorado	12%	364
Arizona	18%	8,325
New Mexico	12%	4,329
Total		25,030

On the basis of these percentage rates, Gradle estimates 25,030 cases among the Indian population. This in a measure checks with the index of 17,320 Indians examined in general group surveys on 24 reservations, between the years 1927 and 1931. In these groups 1,213 positive cases were found—a general percentage of 7. The Indian population as of January 1, 1938, is reported as 342,497. Assuming that 7 per cent of this population were infected, we would have among the Indian groups about 24,000 cases. Of course this does not approach accuracy, but these general figures are mentioned to show that the trachoma problem which confronts the health division of the Indian Office is comparable to the infectivity rate of the rest of the entire population. This rate of Indian infectivity is not uniform. The highest infection group now is the Navajos, in Arizona, where approximately 30 per cent are infected, whereas among the Florida Seminoles there has never been a case reported, nor is trachoma found among the Taholah group at Neah Bay in the northwest tip of Washington State.

Quoting from a report prepared by Mountin and Townsend while on a survey in 1934:

* A trachoma survey throughout Oklahoma, in November, 1939, showed 366 cases in 3,092 Indian school children examined—an incidence of 11.8 per cent.

"Miscellaneous groups in Wisconsin, those at Cherokee, North Carolina, and at Cloquet, Minnesota, show practically no trachoma. Among the Mission Indians of Southern California, it runs about 3 or 4 per cent. In the Northwest there is little trachoma west of the Cascade Mountains, but among the Flathead, Blackfeet, and other Montana tribes, 20 per cent or more of the Indians show evidence of the disease. In the Dakotas about 5 per cent of the Sioux have trachoma. The Chippewas in Minnesota have less. In the Southwest the same differences are to be found among the several tribes. For example, at Zuni fewer than 1 per cent of the Indians have trachoma, while in the pueblos about Laguna the incidence runs from 16 to 25 per cent. About 30 per cent of the Navajos show evidences of trachoma and the same is true of the Apaches at San Carlos and Fort Apache; but, curiously enough, a survey of the Apaches at Jicarilla revealed only 1 per cent of the Indians to be afflicted with the disease.

"This peculiar incidence, especially when a high infectivity rate is noticed in one tribe contiguous to another tribe where the rate is almost nil, and yet social intercourse and free intermingling prevail, is a matter that warrants further study and research."

Late in the year 1936 an attempt was made to ascertain the exact number of blind Indians of which we had record. This was done in order to gather information as to the number of blind Indians who might be benefited by the provisions of the Social Security Act. For the purpose of definition, blindness was considered to exist when the vision in both eyes corrected was 20/200 or less. Reports were received from a total of 52 reservations having a combined population of 165,558. The total number of blind in this group was 971; 372 from trachoma alone; 45 because of trachoma and other conditions; and 554 comprised a group of other conditions and unknowns. Many in this group were totally blind in both eyes.

For many years the Service has tenaciously "stuck to its last" in efforts to alleviate this scourge. It has been a long, hard road. Special physicians, working under the general direction of the medical director in charge of trachoma activities, have been appointed for the purpose of visiting reservations and boarding schools, making diagnoses, doing what operative work is necessary, and prescribing treatment by the use of silver nitrate, copper sulphate,

zinc sulphate, chaulmoogra oil, and the various armamentaria of drugs used from time immemorial in the treatment of trachoma. Giving instructions as to future treatments, he goes on his way to visit another center, and perhaps does not get back to visit these cases for six months or more. Today we have 12 special physicians and 19 nurses so operating. Even so, by health education, and the co-operation of enough Indians to follow their treatment through, there has been a remarkable reduction in the trachoma rate. Certainly figures today nowhere approximate the high incidence reported in the 1912 survey. An example of intensive concentrated treatments is that of the Fort Apache Trachoma School. Here all the Indian children of that reservation who had trachoma were treated. The disease was practically wiped out among the children, but it took four years to do it.

In connection with the Fort Apache Trachoma School, the Service for the past four years has been conducting valuable research studies under the general supervision of Dr. Phillips Thygeson, of Columbia University. It might be well to mention briefly here some of these activities. Early in 1935, Thygeson, and Proctor of Santa Fe, gave a human volunteer trachoma by inoculating his eyelids with the filtered scrapings from Indian trachomatous eyes. In the belief that trachoma was in fact a filtrable virus, these studies were continued with baboons. These studies finally led to a report on the etiology of trachoma, submitted by Thygeson and Richards before the American Medical Association, in San Francisco, in June, 1938. It was stated: "The conclusion has been reached that trachoma is a virus disease and that its epithelial cell inclusions consist of masses of virus imbedded in a matrix consisting largely of glycogen."

There were other studies concomitant with these which time does not permit to discuss here, and in which Dr. Alson E. Braley, University of Iowa, participated. But a few might be mentioned. No evidence was found to incriminate insects as a vector of trachoma virus. No evidence was shown that trachoma virus will multiply in the interior of eyes after inoculation into the vitreous. Experiments suggested that there was no immunity of trachoma produced by inclusion blennorrhea virus. Inclusion bodies were found only in the epithelium of the eye and not in the sub-conjuncti-

val tissue. It has not been possible to date to cultivate the virus artificially in the laboratory, on living tissue.

In the meantime, Dr. Fred Loe of the Indian Service, on the Rosebud Reservation in South Dakota, interested in the belief that trachoma was produced by a virus, as shown in the early studies of Thygeson and Proctor and by Thygeson's experiments on baboons at Fort Apache, thought of the use of sulfanilamide as a possible agent in the treatment of trachoma. He first wrote me in December, 1937, stating in part, "We had a few cases of trachoma here that seemed to resist every kind of treatment. We started two of them on sulfanilamide, using as a dose one-third of a grain per pound of body weight. It was truly wonderful the way those eyes cleared up and they were cleared up in about two weeks. We treated, in all, only 20 cases, but the results have been the same in all. Of course this is too small a series to say that it will cure, but I do think it is the most wonderful treatment I have ever seen in trachoma, and as you know I have been treating trachoma for 20 years."

Proceeding cautiously (which should be the practice of all investigators), Dr. Richards, our Trachoma Medical Director, was sent to the area for the purpose of observing these phenomenal reports. He thought, as I did, after examining Loe's cases, that there was merit in more intensive studies with this treatment in certain selected areas in the Indian country and at the research laboratory at Fort Apache as well.

It was found that sulfanilamide definitely arrested trachoma in baboons in a comparatively short time. In one baboon within 15 days the disease practically disappeared. Nor, after treatment of a human case, was it possible to infect a baboon with the scrapings of these eyes after the eighth day. Inclusion bodies rapidly disappeared. Loe made a preliminary report of his field observations before the American Medical Association in San Francisco in June, 1938, which appeared in the *Journal of the American Medical Association*, October 8, 1938. His conclusions follow:

> "Improvement of subjective symptoms:
> (a) Cessation of lacrimation within twenty-four hours.
> (b) Loss of photophobia within twenty-four hours.
> (c) Improvement of vision within seventy-two hours in cases of pannus.

"Improvement of objective symptoms:

(a) Paling of the conjunctiva.

(b) Paling of the trachomatous patches and flattening of the granules and follicles. At the end of three weeks of treatment a few flat-topped granules remained, and we found that only after several months did these entirely disappear. The medication was not continued during these several months, however. The 93 patients treated in boarding schools during January and discharged as improved are examined at monthly intervals and continue to show improvement in the conjunctiva without further medication and with no exacerbations of any kind. Examination May 12 showed 12 with slight activity.

(c) In the cases in which there had been no scarring from instrumentation, the conjunctiva at the end of two months apparently resumed its normal velvety texture."

During the past year, intensive sulfanilamide studies have been carried out at 11 agencies throughout the Indian country situated in Arizona, Minnesota, Oregon, Montana, New Mexico, Wyoming and Nevada, and at the Fort Apache Trachoma School. At the 11 agencies, not counting the Fort Apache Trachoma School, 1,023 Indians started treatment and 959 completed treatment. Within three weeks, 413, or 43 per cent, were arrested and 481, or 50 per cent, were improved. On subsequent examinations, 122 were found to be arrested, which gives in this series a total arrestment at the time of the last examination of 55.7 per cent. Improvement in vision was found in 237 patients, and 65 were not improved at end of treatment. It should be understood that from the series we have studied, arrestments occur continuously for some time after all treatment is stopped. In other words, a degree of arrestment reported at the end of one examination does not necessarily mean that this will be the total number in the series studied.

Eighteen months ago on the Rosebud Reservation, 202 were treated with sulfanilamide. In this group, one-third of a grain, with equal parts of bicarbonate of soda, was given for about 18 days. After 18 months, this group has just been re-examined and 196 are reported as arrested, and the remaining six improved.

I have with me a breakdown of the work done at these 11 agen-

cies, and I shall mention just a few of them. For example, at the Carson Agency in Carson, Nevada, there were 84 Indians who started treatment and 64 finished. They were treated for 20 days from the first to the twentieth of May of this year. At the end of treatment, only 4 were reported as arrested, or 6.2 per cent. The same group was examined in September, 1939, from May to September, and 43 were arrested.

At Rocky Boy Agency, Montana, 50 started treatment; 50 finished treatment. From November 29, 1938, to March 9, 1939, trachoma in 4 of the 50 patients was arrested. On examination in June, 16 patients were found in whom the disease was arrested. So it goes.

Again, on the Winnebago Reservation, eight months ago 162 were given the same treatment and have just recently been re-examined. It was possible to find only 98 in this group, of which 87 were found to be arrested, eight improved, and three unimproved. It would seem that this drug sterilizes the eyes, that is, destroys the virus, and the subsequent healing is in accord with nature's own process.

It has been reported from the Fort Apache Trachoma School during the last year that 167 were given the sulfanilamide treatment for 21 days. Within 30 days' time 125, or 75 per cent, were definitely arrested. The remaining 42 were arrested after being given a second course of three weeks' treatment. Compare this with the old treatment method. During the four years that the Fort Apache School has been in operation, 428 Indians were treated, according to the old methods. In that time, 215 were arrested as follows: 37 during the first year; 65 during the second year; 67 during the third year; and 46 during the fourth year.

Results of treatment by local applications may be observed as reported from the United Pueblos, Consolidated Ute, and Mescalero Agencies. (See Table on page 287.)

When sulfanilamide was first used on the Rosebud Agency in August, 1937, the dosage was one-third of a grain per pound of body weight, with an equal amount of sodium bicarbonate, given for 10 days, at four-hour intervals. Then the dosage was decreased to one-quarter of a grain of sulfanilamide, with an equal amount of sodium bicarbonate given for 14 days, at four-hour intervals. No other medication was allowed during this period.

Trachoma Annual Reports—1938–1939

Usual Treatments Without Sulfanilamide

Place	*Examined*	*Trachoma*	*Suspected Trachoma*	*Folliculosis*	*Treated*	*Arrested*
United Pueblos						
Boarding School . .	995	159	39	8	206	58
Day School	1,733	149	71	29	246	7
Mission School . . .	558	19	6	6	4	5
Total	3,286	327	116	43	456	70
Consolidated Ute						
Boarding School . .	261	63	16	6	85	0
Day School	54	2	5	1	8	0
Total	315	65	21	7	93	0
Mescalero						
Boarding School . .	183	23	10	5	38	0
Grand Total . . .	3,784	415	147	55	587	70

Since then, various doses and treatment periods have been tried. At present the procedure of choice is one-third of a grain of sulfanilamide per pound of body weight, for five days; two days' rest; and repeat the same dosage for another five days, of course with equal amounts of sodium bicarbonate; then stop all treatment. When improvement does not follow, the treatment is to be repeated.

To date, no advantages in the use of prontosil over sulfanilamide have been demonstrated. Except in cases—and there have been a few—where sulfanilamide can not be tolerated, neoprontosil has been given with equally good results, one-half of a grain or more per pound of body weight being used. When neoprontosil is used, no bicarbonate of soda is necessary. In all our treatments with sulfanilamide or neoprontosil, patients are kept under close professional scrutiny. We have given it only in the hospitals or in boarding schools. But in a few instances it has been administered in day schools, with a corps of physicians and nurses on hand.

Of interest is the observation that sulfanilamide has no effect as a curative on follicular conjunctivitis.

Just what happens in a trachomatous eye under sulfanilamide treatment alone has been reported by Gradle, following definite information in 772 cases. Of the 772 cases, 40 were in the Illinois Eye and Ear Infirmary, 110 in the Trachoma Clinics of southern Illinois, and the remainder divided among the Sioux, Arapahoe, Shoshone, and Montana Indians. He says:

> "Within two days after the use of sulfanilamide is started the subjective symptoms are relieved and the disease is stopped at whatever stage it then happens to be in. The cornea is apparently affected first in that the superficial trachomatous process disappears promptly. Then the calibre of the vessels of the pannus narrows and the space between the vessels increases and becomes clearer. Any scarring that is present remains, but the infiltrates disappear rapidly. Conjunctival secretion lessens at the same time and usually disappears within a week. The conjunctiva becomes smoother, loses the angry red hue, and assumes a more normal pink color. Granules and follicles begin to decrease after about the second week, but remain, particularly in the depths of the transitional folds, for many weeks and months. The progress of the trachoma is definitely stopped within two to three weeks, and such reparative processes as are possible make their appearance. Of course, the connective tissue, the scars, and the other ravages of trachoma remain and are not affected by the drug. Exacerbations are extremely rare. I know of only four or five. However, the conjunctiva, both tarsal and bulbar, remains congested for many months. Whether or not all these eyes will eventually become pale, I am unable to say."

Because of the reported dangers of sulfanilamide, it has been given by the Indian Service only under hospital or school dormitory conditions, where medical service is constant.

In our series of 1,023 patients starting treatment, with 959 finishing in an average time of 21 days, only eight developed severe clinical reactions, manifested by severe headache, dizziness, fever and vomiting; 238 experienced slight reactions of mild headache and dizziness.

Blood counts were made of the group treated at Fort Defiance,

Arizona, this summer (112 in all) to determine if any change resulted in the cellular blood picture.

12 on sulfanilamide were given daily cell counts
12 controls were given daily cell counts
10 on sulfanilamide were given cell counts twice weekly
10 controls were given cell counts once weekly

The remainder of those treated were given blood examinations at the beginning and at the end of treatment.

A determination was made of the hemoglobin index—red blood cell count and white blood cell count—also the percentage of neutrophils, large monocytes, small lymphocytes, eosinophils and basophils.

No change worthy of note was observed in the blood picture during treatment or at the end of treatment or in the control group. In both groups—that is, those under sulfanilamide therapy and those not treated—the white cell count was reduced to some degree. There was no change in the hemoglobin index or in the percentage rate of the various blood cells.

There has been some difference in results in the use of sulfanilamide. We believe it has been on account of technique, rather than the fact that the drug has no value. It seemed necessary to keep up a certain blood concentration. If sulfanilamide is given only twice a day, it is eliminated so rapidly that the patient would not have it constantly in the body long enough to benefit thereby. Hence we give it in four doses during the twenty-four hours.

The general results during the past year are encouraging and we are stimulated to intensify still further our endeavors on more fronts in our long warfare against trachoma.

The Rôle of Health Departments in the Prevention of Blindness*

John L. Rice, M. D.

DR. RICE discusses what the various bureaus and divisions of the New York City Health Department are doing to help sight conservation.

THE work of the New York City Department of Health is usually thought of in connection with the contagious diseases, with tuberculosis, pneumonia, syphilis, typhoid fever, infant and maternal hygiene, the control of the milk supply, and the manufacture and distribution of antitoxins and vaccines. These are, to be sure, some of our major activities, but I should like to tell you of the many ways in which the Department is also taking an active part in the prevention of blindness.

Our activities in this field begin with the newborn child. A law, which the Department was mainly instrumental in formulating, requires that the doctor or midwife in attendance instill a drop of 1 per cent silver nitrate or other silver salt into the infant's eyes. The purpose of this is to prevent or ward off any gonorrheal or other infection of the eyes. Ophthalmia neonatorum, a purulent inflammation of the conjunctiva in the newborn, is characterized by marked swelling of the conjunctiva and lids, and a copious discharge of contagious pus. As you know, before this health measure was made compulsory, eye infections at birth were a frequent cause of blindness. If a purulent eye infection develops in spite of this precaution, the attending doctor or midwife must report this case to the Department of Health which thereupon sends an oculist to the home of the infant to make a smear of the discharge for exam-

* Presented at the Annual Meeting of the National Society for the Prevention of Blindness, New York City, October 26, 1939.

ination at our diagnostic laboratory. If the examination discloses a gonorrheal infection, arrangements are made for proper isolation and hospitalization. This preventive work of the Department has materially reduced the incidence of blindness, saved a good deal of anguish for the parents, and misery for the child, and has also lessened the expense and upkeep of institutions for the blind and visually handicapped. In passing, I may add that the care of the pregnant mother at our prenatal clinics also prevents the infection of the infant's eyes during childbirth.

A generation ago, when the Health Department first undertook the supervision of the health of school children, trachoma was one of our serious public health problems, and was the cause of much blindness in adults and children. This disease is now practically eradicated, due in large measure to the work of the Department of Health in clearing up the underlying conditions, such as insanitary, unhygienic housing, dirt and filth that helped the spread of this scourge. I can cite a few figures: About 30 years ago, the Department of Health opened a number of eye clinics for the purpose of treating trachoma and trachoma suspects among the school children. In 1909, nearly 45,000 cases of trachoma and trachoma suspects among the school population of the City of New York were treated by various clinics and private physicians, a large proportion in the eye clinics of the Health Department. Today, because of this preventive work, there are practically no cases of trachoma among school children. Of course, this work has also been aided by the facts that there is very little immigration, a more thorough eye examination is made by the doctors of the immigration service, and people have been made more eye conscious through health education.

Smallpox is another disease which formerly accounted for a goodly number of blind people whenever this disease was epidemic, by the formation of pox on the corneae and the destruction of the eyes. The compulsory vaccination of school children is so thoroughly carried out that smallpox as a cause of blindness has been entirely eliminated.

Keratomalacia, the first symptom of which is night blindness, is a destructive condition of the eyes which results in dry, dense corneal opacities and blindness, caused by a deficiency of vitamin A

mainly, and also of B, C, and D. It was formerly encountered as an accompanying condition of marasmus and malnutrition in infants. Education of the mothers in infant care and feeding, at our baby health stations, has undoubtedly been instrumental in our rarely seeing any cases of keratomalacia in our city.

Congenital syphilis, which frequently manifests itself as an interstitial keratitis in the child, is often a cause of blindness. The prevention of this inflammatory condition consists in the detection of syphilis in the parent prior to conception, or during pregnancy, and treatment of the disease if discovered. Here the Wassermann test is of great value. A good deal can be done for the child that has developed an interstitial keratitis, if Wassermann positive, by giving the proper anti-luetic treatment, so that the eye condition clears up with good vision, and the treatment is carried on until a cure is effected. The Department of Health at its many social hygiene stations does the necessary blood test, and anti-luetic treatment is given free to adults, and to children whose parents are unable to pay a private physician for this necessary prolonged treatment. At regular intervals during the anti-luetic treatment an oculist attached to the service examines the fundus of the eyes of each patient, to note the effect of the arsenic or other medication used by injection in treatment, for it must be borne in mind that the optic nerve can be affected by some of the anti-luetic drugs used, and that these could cause blindness.

Acquired syphilis often produces a primary optic atrophy in both eyes, central choroiditis, chorioretinitis, etc., and complete loss of vision. The Department of Health, as above explained, is instrumental in preventing the development of these complications by anti-luetic treatment in its various social hygiene stations.

The bureau of health education, through the distribution of posters and pamphlets, by public lectures and radio broadcasts, warns parents and children about eye care, and the necessity of immediate and skillful care and attention by an oculist of any eye injury no matter how trivial it may appear. Minor eye injuries often result in serious impairment of vision because of neglect or indifference. The outlawing of the possession and use of BB air guns and firecrackers in this city is a wise precaution.

Conservation of eyesight prevents blindness and here again the

Department of Health plays a rôle through its medical examination of school children. At regular intervals during their school life, the medical inspector examines the pupils for physical defects. Their nutrition status is noted, vision is tested by the Snellen chart, and if vision is found defective, the parent is informed, and instructed to obtain treatment and glasses. Every effort is made by the medical inspector and school nurse, aided by the principal and teacher, to get refraction defects corrected. Our experience shows that nearly 25 per cent of the city's school children have a visual defect of 20/33 or worse, and most of these children can be greatly aided by the prescription of proper glasses.

Another important and most valuable activity of the Department of Health is the division of eye clinics. There are 12 eye clinics distributed throughout the five boroughs of the city, each with a well-trained oculist in charge. Only refraction and prescribing of glasses is done at these clinics. If the child's eyes indicate the need of any medical or surgical care, such as the removal of cataracts or brain tumor, treatment of malnutrition affecting the eyes, medical study of any kind, or treatment of congenital lues, the oculist refers the child to the proper institution, clinic or hospital. Only children attending the elementary public and parochial schools, whose parents are on relief or of low economic status are examined at these eye clinics. About 70,000 visits are made to our clinics per year, and about 25,000 prescriptions for glasses are given.

Our eye clinics co-operate with the sight conservation and blind classes of the city school system, in examining the pupils of these classes, and candidates for admission to the classes. The pupils are examined at our clinics every six months to note and watch their progress. A child is recommended for a blind or "braille" class if he cannot do the work of the sight conservation class, or, if any kind of eye work is detrimental to the remaining small amount of sight. When the pupil is about to graduate, both teacher and clinic oculist advise him as to the best future vocation to pursue.

So you see how invaluable is the work of the Department of Health in the prevention of blindness. Its various bureaus and divisions, such as the eye clinics, school health service, social hygiene clinics, prenatal and child health stations, and even its food

and drug division (by preventing the sale, except on doctor's prescription, of weight reducing dinitrophenol, a drug which has often caused the rapid formation of cataracts in young people), all play a rôle in the prevention of blindness.

I believe that the Health Department's activities which I have described have undoubtedly saved many people from blindness, and prepared them for a happier, fuller, and more useful life for themselves and for society.

The Readability of Stencil-Duplicated Materials

Matthew Luckiesh and Frank K. Moss

EMPHASIZES the need for securing the best stencil-duplicating process in order to insure the highest amount of visibility.

PRINTED matter is commonly read with little consideration of the various factors which affect its visibility and readability. Among the important controllable factors, such as size and design of type, reflecting characteristics of paper and ink, level of illumination, distribution of brightness in the visual field, the quality of printing or of reproduction is a prominent one which often can be improved. Any of these factors which decrease visibility unnecessarily should be considered as a contributory cause of undesirable physiological effects of seeing.

Undue strain and fatigue of the eyes have long been known to be directly injurious to the eyes. In many cases the effects extend beyond the eyes, into the realm of health of the human being. Recent researches[1] have revealed other deep-seated effects of reading, such as tenseness. This decreases as the visibility of the reading matter increases. The rate of blinking changes similarly. These effects are at least symptomatic of strain and fatigue. Obviously, reading may be properly considered a severe task of near vision. Reading for long periods is, in a sense, an unnatural task of seeing imposed by civilization. In the light of increasing knowledge and increasing critical use of the eyes, every reasonable contribution should be made toward easing the task of seeing. In the most prevalent visual task of near vision, this means increasing the visibility and readability of the reading matter.

The present studies of the visibility and readability of stencil-duplicated materials were suggested by the observation of the wide

differences in the quality of the reproduction. Since these materials are used extensively in the schools as well as in the work world, the visual ease with which they are read is correspondingly important from the viewpoint of ocular hygiene and general well-being. We have chosen for study two stencil-duplicated materials which may be described as "average" and "superior" in quality, and have applied criteria of visibility and readability which we have used for several years with consistent results in previous studies in typography.[1] In general, the present data pertain only to the variations in the stencil-duplicated materials now available and do not involve quantitative comparisons between these materials and those duplicated by other processes or those printed from type of equivalent size.

In the discussion and interpretation of these data, we have emphasized the techniques employed in appraising the visibility and readability of the duplicated materials rather more than the empirical data obtained. Eventually it may be possible to present the results of investigations of this kind in brief tabular form when experimental procedures have been thoroughly standardized and accepted. However, in the light of present knowledge, and of our relatively new criteria, it does not appear desirable to present numerical data without an adequate discussion of the methods of appraisal.

Duplicated Materials

While it is conceded that considerable latitude is involved in the selection of the specimens described as "average" and "superior," it also follows that this ambiguity is, in itself, an indication of the marked differences in the quality of these materials. Usually these differences far exceed those found between average and superior printed matter involving the same size and face of type and the same quality of printing paper. In general, every effort was made to select the specimens of "average quality" with due consideration to both the extreme range in quality and the prevalence of the various qualities in common use. The specimens described as "superior" represent the grade of material which is obtainable with adequate skill, care and equipment. However, it may be stated that the latter is actually a commercial product rather than a theoretically ideal one.

Our specimens were reproduced on white paper with black ink. The stencils for both specimens were prepared with the same typewriter and were reproduced upon the same grade of paper in each case. The variation in the quality of the duplicated specimens resulted from the use of different duplicating materials and from different degrees of care in reproduction. In general, the materials designated as superior were quite uniform in degree of contrast or boldness, while the average specimens involved considerable variation in the boldness and visibility of individual characters or letters. Due to the uncertainties of reproducing these specimens herewith, the accompanying illustration (Fig. 1) of these materials may be somewhat distorted. However, samples of the actual specimens may be obtained from our laboratory.

AVERAGE

While here I was given an opportunity to w
struments, sounders and relays, as well as re
galvanometers like those used by telegraph en
lines. In November, I went to Menlo Park to
in the very building where the carbon transmi
perfected.

SUPERIOR

I mention this because it shows how intere
even at this late day, in his first love, the
the table in the corner with its instruments
other evidences of that affection about the p
it came much of his inspiration, and practica
lier inventions centered about it.

Fig. 1.—Illustrating the two stencil-duplicated materials investigated. Standard typewriter type, approximately equivalent to 12-point in size.

Experimental Procedures

A distinction between *visibility* and *readability* is made since the several techniques for typographical studies do not necessarily involve or appraise the same visual factors. For example, the visibility of a given line of print, as measured with the Luckiesh-Moss Visibility Meter,[2] is not appreciably altered by the proximity of

adjacent lines of print, while it is a matter of common experience that the ease of reading (readability) is markedly influenced by the space (leading) between successive lines.[3] In general, the criterion of readability is the more comprehensive since it is a function of the factors which influence visibility as well as certain psychological factors, such as distraction and attention. However, the techniques for appraising readability are far more tedious of application than are those for measuring visibility. Although the attributes of both visibility and readability are to be considered at the present time, the results of previous researches indicate that the two criteria are at least qualitatively related and that typographical characteristics which are found to be favorable by one criterion are usually found to be favorable by the other and *vice versa*.

Visibility of Stencil-Duplicated Materials

The data in Table I show the relative visibilities of the average and superior duplicated impressions on so-called white[5] paper possessing a reflection factor of 84 per cent. These measurements of visibility were made with the Luckiesh-Moss Visibility Meter and involved the recognition of words, as a whole, rather than the recognition of each individual letter. The method of measurement, therefore, is considered to approximate the perceptual conditions involved in normal reading. The visibility meter and the associated techniques have been described briefly in previous issues of this journal[4] and in detail elsewhere.[2] It will be noted that the visibility of the average material is about 70 per cent of that of the superior material.

Table I

Each of these values was derived from 100 separate measurements of relative visibility. Ten different samples of each stencil-duplicated material were used in determining these values.

Superior	100.0
Average	70.6

The significance of the difference in visibility between the average and superior specimens may be better appreciated by expressing this difference in terms of size of type. For example, the difference

in visibility between the two stencil-duplicated specimens is equivalent to that between 10-point and approximately 7-point types equally well printed on the same grade of paper. In considering this comparison, it may be helpful to note that 7-point type is used for body text by most newspapers while 10-point type is commonly used for well-printed books.

The relatively low visibility of the average duplicated material may well be considered an indictment of this material with respect to the degree of visibility which is technically attainable. However, the size of the characters of these duplicated materials compensates somewhat for the inferior quality of the reproduction. The latter characteristic would be revealed more strikingly if the duplicated material involved the same number of words per unit area as does the average printed book. It is not inferred that economical considerations of type size are necessarily the same in the two cases. However, these results indicate the visual advantages to be gained through the use of types of larger sizes than those commonly used at the present time.[6]

Readability of Stencil-Duplicated Materials

It is becoming increasingly certain from numerous investigations which we have made during recent years that the relative ease with which different materials are read may be revealed by observing the rate of involuntary blinking while reading under controlled conditions. For example, the data of Fig. 2 have convincingly established the fact that the rate of blinking while reading under a wide variety of visual conditions is invariably lowered when the conditions for seeing are made more favorable. Primarily, the rate of blinking decreases when the visibility of the reading matter is increased. In addition, there is a wealth of evidence from sciences of physiology and psychology which reveals the significance of this criterion from a fundamental viewpoint of ocular strain and fatigue.[7] In brief, this criterion of ease of seeing possesses the advantages of fundamental significance, simplicity in application, objectiveness and satisfactory sensitivity. The consistently successful results obtained in applying this criterion confirm our general theory that ease of seeing is more readily and certainly revealed by involuntary reactions than it is by criteria of performance over

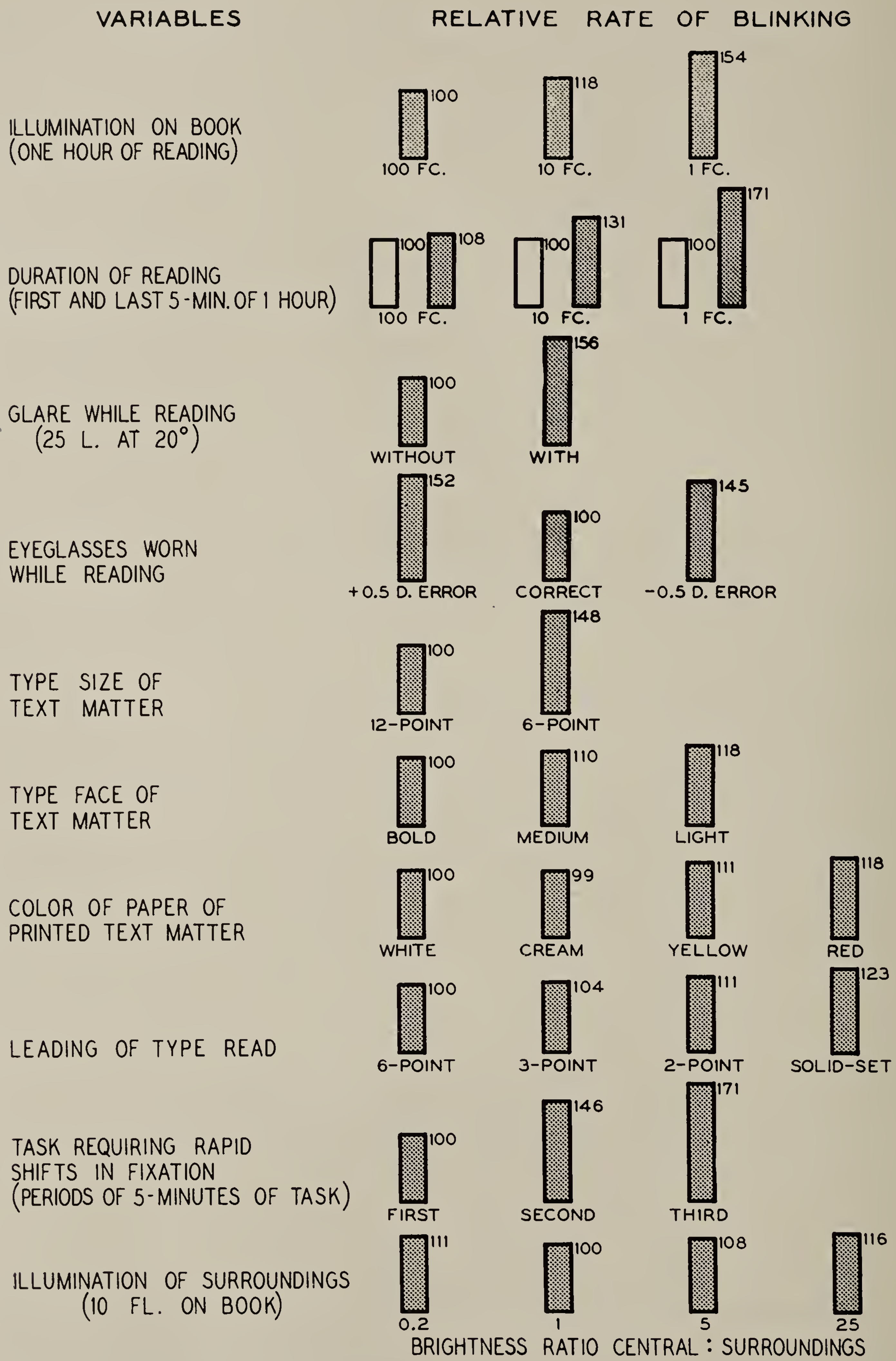

Fig. 2.—Changes in the rate of blinking while reading as various factors which influence visibility and ease of seeing are varied individually.

which the subject exercises voluntary control. Speed of reading may be cited as an example of the latter.

In applying the criterion of involuntary blinking in the present investigation, the subjects read for periods of one half-hour on each of several different days and the rate of blinking was counted during the first and last five minutes of these periods. Only one kind of duplicated material was read during each period. During the period of reading, the subject was seated before a large booth which contained a suitable rest or stand for the reading matter. The level of illumination on the reading matter was ten foot-candles and the lighting conditions were constant and without any preventable glare being present. Thus the environmental conditions, as well as the quantity of light and the quality of the lighting, remained constant throughout the entire investigation. The reading matter was of general interest and the subjects were merely instructed to read at their customary rates during the test period. Hence it is reasonable to conclude that the experimental conditions were as nearly normal as it is possible to obtain with the essential laboratory control.

The relative rates of blinking while reading the two grades of stencil-duplicated materials are summarized in Table II.

Table II

The number of blinks during the first and last 5-minute periods of one half-hour of reading of the stencil-duplicated materials. These values represent the geometric means of the data obtained from 12 subjects.

Material	*First 5 Min.*	*Last 5 Min.*	*Per Cent Difference*
Superior	12.2	16.1	30
Average	13.3	18.2	37
Per Cent Difference	9.0	13.0	—

These data indicate that: (1) the rate of blinking while reading the average material is measurably greater than it is while reading the superior material; (2) the rate of blinking increases markedly as the reading progresses during the 30-minute test period; and (3) the rate of blinking increased more for the average material than for the superior material during the half-hour reading periods. Thus this investigation again confirms the validity of the rate of

involuntary blinking as a criterion of ease of reading from two fundamentally significant viewpoints. Furthermore, it will be noted that the rate of blinking is inversely related to the visibility of the material read in this and many other investigations. Hence measurements of visibility may be taken as indices of readability in future studies of a similar nature. It should be obvious that the correlation between visibility and readability greatly simplifies the study of typographical problems.

It is also of interest to note that the difference in the rates of blinking while reading these two materials is approximately one-third of the increase in the rate of blinking during the half-hour test period. Thus it seems reasonable to assume that the difference in the ease with which the two materials are read is of importance when compared to the effects of effort which are indicated at the close of the 30-minute period of reading. In the absence of additional information it is obviously impossible to compare (1) the difference in the readability of these tasks with (2) the effort in reading for 30 minutes upon a quantitative basis. Eventually this may be possible.

Speed of Reading

The tacit assumption is often made that the rate of reading should increase as the visibility of the reading matter is enhanced. Unfortunately, as far as test procedures are concerned, this assumption is not a valid one in all situations or for all subjects. In some cases, for example, it appears that the subject merely expends less effort in the performance of a given task rather than to increase his "production" (rate of reading) when visual conditions are improved. Such a reaction to improved conditions is not a surprising one. Conversely, the rate of reading may be maintained notwithstanding increased difficulty due to decreased level of illumination, etc. This tendency of the reader to compensate tends to make rate of reading an undependable criterion of ease of reading. Furthermore, there is much evidence that the rate of reading is affected and actually limited by perceptual phenomena, habits and rhythms in reading more than it is by the physical characteristics of the materials now in common use. Obviously, extreme conditions due to unusual materials such as Old English type, deeply colored

printing papers or abnormally low levels of illumination are excluded from the foregoing generalization. In brief, the rate of reading may be an indication of the readability of the material, but it is not necessarily so. For example, the fact that two different materials are read at the same rate does not prove that the two materials are equivalent in readability. On the other hand, if a statistically significant difference in the rate of reading different materials is found, it may be safely assumed that the materials are different in readability.

The average rate of reading the two grades of stencil-duplicated materials is summarized in Table III. In considering these data, it is to be recalled that the subjects were instructed to read at their natural or normal rates. It may also be assumed, in view of the quantity of material read by each subject, that uncontrolled variables such as the character of the text matter and the attention of the subject to the text would be equalized for the two specimens of duplicated material.

TABLE III

The average rate of reading two stencil duplicated materials maintained during a 30-minute period. These values are arithmetic means of the individual data.

	Superior	*Average*
Lines read per minute	25.0	23.5
Relative rate of reading	100.0	94.0
Per cent probable error	2.0	2.4

It will be noted from Table III that the average material was read approximately 6 per cent more slowly than the superior material. This differential is significantly smaller than that indicated by the criterion of visibility (30 per cent) and the average rate of blinking (11 per cent). Obviously the per cent probable error from a statistical viewpoint is merely a matter of quantity of data. These results, and others of a similar character, indicate the relative insensitivity of the criterion of speed of reading. This characteristic, and the uncertainty that even qualitative differences in speed of reading will be obtained with different materials, obviously limits the usefulness of this criterion in researches which aim to ascertain

the effects of various factors in normal reading under practical conditions.

Summary

The results of the present investigation indicate that the visibility of the average quality of stencil-duplicated materials in common use is approximately 70 per cent of that which may be achieved by the best stencil-duplicating processes and experience with them. It follows from this fact that the average materials are unnecessarily difficult to read and this conclusion is substantiated by the rate of blinking while reading these materials. A similar conclusion is also indicated by the criterion of speed of reading. Of the three criteria, that of relative visibility is the only one yielding results which, at present, may be compared upon a quantitative basis with respect to visual functions and limitations. Fortunately visibility measurements are, with certain fairly obvious precautions, reliable indicators of relative readability.

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The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

Treating Trachoma by Trailer

Two years ago the West Virginia State Health Department and the Department of Public Assistance co-operated in a survey of the blind in this state that resulted in discovering more than 700 cases of trachoma. They further found that this trachoma was most widespread in the southern counties of the state, that many of the cases were of long standing, and that a large per cent of the people having trachoma were on the relief rolls. From that time on the Department of Public Assistance made plans for the establishment of a mobile treatment unit —for most of the cases were in rural sections and the contagion of the disease made it most impracticable to move the patients to the cities for treatment.

Our department was and is working on a reduced budget, new economies daily becoming necessary. Grants have long since been cut below the budgetary deficiencies. Yet both Mr. Garnett, department head, and Dr. Butterfield, in charge of the department's medical program, felt that the mobile unit was one of the necessities of our integrated program for reducing want in West Virginia. This year the trachoma unit has become an actuality, for the thirty-foot trailer, staffed with an ophthalmologist and a nurse, started on regular treatment routes June 12. There are now 323 active cases of trachoma under treatment in the 17 southern counties reached by the unit.

The trailer was especially built and contains a treatment chair, several cabinets, a refrigerator, a small cot. There is running water and at one end is a small "dark room" where the ophthalmoscope is used. It is pulled by a Dodge tractor and covers approximately 650 miles each week.

The trailer operates out of Charleston, the capital city, visiting

each of the clinic stops once a week. Besides the ophthalmologist, Dr. J. A. Arbuckle, and Miss Nash, the nurse in charge, there is a field nurse who is furnished by the State Health Department and who makes the necessary preparation for the clinics and to some extent supervises the families under treatment.

Last week I went in our trachoma trailer on its regular Monday trip to Clay and Calhoun Counties, both rural, and with relief loads of 500 and 420 respectively. Their combined population is 23,991.

It was not at all bad riding in the trailer. Miss Nash and I sat on the cot and Dr. Arbuckle sat in the treatment chair, and the jolts were negligible, especially after we reached the main highway. Our first stop was at Blue Creek, eleven miles from Charleston—a crossroads community where five patients awaited us.

They stood in front of the community store—a ramshackle building covered with advertisements of various kinds of snuff. The halt and the blind they truly were, but they seemed very glad to see us (not all of them could actually see us, but the word spread that we were there and they came quickly toward the trailer). All of them were poorly dressed, but they had obviously made some attempt at cleanliness and neatness for this weekly event. The two middle-aged women wore cheap cotton dresses too long for them, and their figures were completely shapeless. The men needed shaves and there was tobacco juice around their mouths. . . . *And their eyes!*

I had never seen trachoma before, except a very mild case once in the office of a city physician. Then it had seemed to me only an irritating inflammation of the eyelids. This, up in the hills, aggravated by dirt and malnutrition and of long duration, was different. The eyes were a dreadful red-gray, and in two cases the eyelids had grown so short that the eyeballs stood out horribly from the face. One of the men had already lost one eye.

The first patient that morning was Jim. He was about forty-five and lived on a farm three miles from the Blue Creek store. He walked a little stooped and his hair was gray, but if it had not been for the distorted eyelids and discolored eyes Jim would have been almost handsome. The week before, Dr. Arbuckle had done a Holtz operation on the left eye. That is, he had slit the eyelid, taken out a portion of the gristly substance that was forcing the lid to turn in, and had so shortened the lid that in this one eye Jim no longer felt the pain of the eyelashes rubbing the eye. This morning Dr. Arbuckle was to take out the stitches. He put a few drops of pontocaine in the eye to deaden pain.

"You're not scared, are you, Jim?" Dr. Arbuckle asked.

"No, I ain't scared. It don't do

no good to get scared, 'specially before you're hurt." The other patients waiting just inside the trailer door laughed appreciatively.

Dr. Arbuckle removed the stitches and looked at the inner eyelid. It was much better, he observed, than last week.

"Yes, it's better. Feels a lot better. Don't hurt much and I can see more. I've had this disease for 33 years and it was gettin' awful bad."

A week before Jim had been barely able to distinguish light from dark. Now, when Dr. Arbuckle put the letter chart ten feet in front of him, he could see the big E at the top of it.

Jim's wife had come in now to watch the treatment. She was, Jim boasted, his third venture in marriage. She smiled at us and nervously twisted the tarnished gold earrings she wore. Her skin looked leathery. Yet I imagine she too was in her forties. "Eight children we've had," she told me, "but they're all growed up now and gone away. One of them had bad eyes, too."

A little girl, about nine, was the next to come in for treatment. She had one bad eye, red and swollen, so that she held her head down to protect it from the light. Dr. Arbuckle dropped some neoprontosil in her eyes and gave her a bottle of pills—sulfanilamide. In this relatively new drug, Dr. Arbuckle told me, seems to lie much hope for the eventual abolition of trachoma. Although the treatments have not been continued for a sufficiently long time to insure results for all cases, there is much evidence that if the treatment is begun in the early stages the disease can be rendered inactive.

The sulfanilamide treatment (neoprontosil is a derivative of sulfanilamide) is used in two kinds of cases thus far: acute cases of long duration and new cases. For the old chronic cases there remains but the oil treatment (chaulmoogra oil), oxycyanide of mercury, and surgery. The old treatment of copper has been completely discarded as too painful and likely to cause deformities of the eyelids.

Dr. Arbuckle explained to me that trachoma is really a severe granulation of the eyelids. The inner eyelids become painfully rough and as they scrape over the cornea they produce certain blindness if the disease is unchecked. Little knots (trachoma bodies) form on the eyelid; the lid forms a gristly layer on its outer surface, which in time forces the eyelid to turn in toward the eyeball, so that in advanced stages the eyelashes comb the eyeballs at every movement. In some cases the eyelid grows fast to the eyeball. The eyeball becomes extremely red and over it is formed a fine gray curtain.

We made five more stops, seeing some 45 patients that day. At every stop there was much the same

situation: poorly dressed men and women waiting eagerly for the trailer, some of them wearing dark glasses, some of them carrying white canes given them by the Lions Clubs of the state. Most of them looked undernourished. I noticed that almost without exception they had bad teeth, even the children.

One little girl who met us at Millstone had walked seven miles that morning. She got up at 4:30 for the long walk.

"Does anyone else in your family have sore eyes?" we asked her.

"Yes, my father has them. He couldn't come today, though. He'll come next week, maybe." There were seven children in the family. We asked her how her father got trachoma and she said that he brought it back from a nearby lumber town.

Some of the men blamed their trachomatous conditions on accidents. "It started when I got dust in my eyes the fall we tore down the power house," one said. Another said that he got sand in his eyes while working on the road. The amazing thing seemed to me that they had been able to endure—and patiently—this disease so long. One of them had had it 35 years; several, over 20 years. The pain must have been indescribable.

Wyoming and Lincoln Counties, in the extreme southern part of the state, have the most trachoma. In the former there is a little girl who walks twenty miles to the trailer stop for her treatment. Another case is that of Goldie, a young woman 27 years old, whose father and mother both had trachoma and spent their entire savings on trying to rid themselves of it. For several years Goldie has had only light perception and has been doing her housework with great difficulty. Since the mobile unit came Goldie's eyes have been operated on, she has been put on the sulfanilamide treatment and can now read the second line of letters on the chart. Her eyes look much better and her general health has improved.

There are many cases not unlike Goldie's. I know that it is too early to make reliable predictions, but certainly the indications are strong that West Virginia has found a solution to her trachoma problem.

—Ann West

State Department of Public Assistance,
Charleston, West Virginia

News of State Activities

THIS Section is devoted to the reporting of sight conservation activities carried on by official and voluntary agencies throughout the country. It presents information supplied by these groups, and serves as a medium for exchange of experiences. Brief and timely items only can be used, because of the limitations of space

Arkansas

"*Trachoma Control Program.*—A review of the eye examinations of applicants for blind assistance through the State Department of Public Welfare indicates that there is a large number of cases of trachoma in the north and northwestern sections of the state.

"In order that a permanent plan might be made to combat this disease, an experimental clinic was planned to be held in Jonesboro, Craighead County, Arkansas, on August 24, 1939. At ten A.M. the clinic doors were opened, with Dr. K. W. Cosgrove, Supervising Ophthalmologist of the State Department of Public Welfare, in charge, assisted by Dr. M. E. Blanton and Dr. O. T. Cohen, approved district ophthalmologists, of Jonesboro, and Dr. W. B. Harrell, Director of the Craighead County Health Department, in whose offices the clinic was held.

"Three hundred persons registered during the day and were examined. Of the 300, 60 persons were diagnosed to have trachoma and were placed under treatment, those on tablets using from five to 20 grains of sulfanilamide per day, administered orally, and each person given a saturated solution of sulfanilamide to be dropped in the eyes four times per day. Written instructions as to the care of the eyes were given to each patient.

"On September 28, 1939, a check-up clinic was held and each of the 60 persons asked to report to the clinic. Forty-three of these persons returned, and the following results were shown:

Results	*Total*	*Tablets*	*Drops*
Excellent	13	9	4
Improvement	28	17	11
No improvement	2	..	2
Cases	43	26	17

Complications to Sulfanilamide:

Nausea	6	Dizziness	2
Rash	4	Constipation	2
Smothering	2	Drowsiness	1
No Complications	10		

Complications to Trachoma:

Pannus	19
Symblepharon	4
Pannus and Entropion	15
Argyrosis	2
No Complications	3

"Mr. John R. Thompson, State Welfare Commissioner, became quite enthusiastic; searched the law and found that he could carry on a program of this type for trachoma control through the Welfare Department if he could 'find the money.' In the meantime, Governor Carl E. Bailey had been studying the statistics on the causes of blindness in Arkansas and felt that some department should attempt a conservative trachoma control program, so Mr. Thompson was invited to his office for a conference. This conference between Governor Bailey and Mr. Thompson resulted in the plan for the trachoma control program which is to be under the direct supervision of Dr. K. W. Cosgrove, under the auspices of the State Department of Public Welfare. A public health nurse and a social worker have been added to the staff and plans for future clinics are being completed; the first is to be held in Mountain View, Stone County, on November 16, 1939, with a large attendance indicated from reports of the county directors from the surrounding counties."

—*Department of Public Welfare, Little Rock, Arkansas*

Colorado

"Colorado is again holding three eye clinics this year in rural parts of the state. These clinics are subsidized by the Division of Maternal and Child Health, and aim to reach elementary school children in chosen rural areas. Over 1,000 children were seen in the four clinics held last year, and it is hoped, through better organization, to care for the same number of children in three clinics this year. The actual diagnosis and refraction of cases is done by members of the State Ophthalmological Society, and these physicians are remunerated by the Division of Maternal and Child Health at the rate of $35.00 per day. Children are admitted to the diagnostic clinic irrespective of their economic status, while refraction and glasses are provided only for the indigent group. A printed report of last year's eye clinic program, with the foreword by Dr. Edward Jackson, will be available for distribution in the near future."

—*Colorado Division of Public Health, Denver, Colorado*

District of Columbia

"*New District of Columbia Law on Prevention of Blindness Effective.*—Dr. George C. Ruhland, Health Officer of the Health De-

partment of the District of Columbia, reports progress in the application of the new law for the prevention of blindness in infants born in the District of Columbia. This law was approved April 27, 1937. Since the new law was enacted he has been following up on procedures used by physicians and hospitals for the prevention of ophthalmia neonatorum. In a questionnaire sent out from the health department through the bureau of maternal and child welfare, of which Dr. Ella Oppenheimer is director, to the superintendents of the hospitals in the District of Columbia, the following points may be of interest:

"1. All hospitals used a one per cent solution of silver nitrate as a prophylaxis of ophthalmia neonatorum.

"2. There were standing orders in the hospitals for these procedures.

"3. Responsibility was centralized for the administration of the prophylaxis. In most cases the physician delivering the newborn, or supervisors in charge of the delivery room, carried this responsibility.

"4. In all but one instance a notation that the prophylaxis has been administered was recorded on the patient's record.

"Dr. Ruhland is much encouraged by the co-operation received from the physicians and hospital superintendents."

—*Bureau of Public Health Information, Department of Health, Washington, D. C.*

"Ophthalmia neonatorum has not yet become an obsolete disease. The District of Columbia Society for the Prevention of Blindness has recently made a study of cases in Washington hospitals, which reveals it to be considerably more prevalent than was generally realized. Any inflammation of the eyes appearing within 14 days after birth was considered ophthalmia neonatorum for this study. Although Washington has twice as many births among the white as among the colored population, nine-tenths of the ophthalmia neonatorum cases studied occurred among colored infants. A hospital which used argyrol prophylaxis had an incidence five times greater than that of a comparable hospital situation where silver nitrate was employed. One-fourth of the total cases were of gonorrheal origin, and about one-eighth were caused by the pneumococcus. Half of the cases gave no report of etiology. Subsequently, the health officer issued a statement to physicians and superintendents of hospitals, calling attention to the law of April, 1937, and repeating the requirement that one per cent silver nitrate be in-

stilled in the eyes of the newborn child immediately after birth unless specific authorization is obtained for use of a substitute."

—*District of Columbia Society for the Prevention of Blindness, Washington, D. C.*

Illinois

"*Annual Report of Trachoma Clinics, 1939.*—The Governor Horner Trachoma Clinics completed their fifth year on June 16, 1939. Trachoma, which for years has been prevalent in southern Illinois, begins for the first time this past year to show signs of diminishing. That there should be a gradual diminution in the incidence of this disease is no surprise to those who have planned and worked for this project. Originally, the Illinois Society for the Prevention of Blindness, which in 1920 and 1930 conducted surveys to demonstrate the presence of this scourge in the lower 16 counties of the state, planned to open a hospital in southern Illinois where trachoma sufferers could be treated. The plan eventually worked out by Dr. Harry S. Gradle, vice president of that organization, proved much more effective in that it made steady treatment available to many more individuals than any hospital could have accommodated. Five clinics approximately 25 miles apart offer treatment for trachoma. Each clinic is open three days a week, and on the other days the nurses make their home calls.

"At the end of the fifth year there are 3,256 positive cases of trachoma under treatment in the five clinics located at Eldorado, Shawneetown, Herrin, Jonesboro, and Vienna. This is 200 patients more than they had a year ago. Today there are 1,295 suspects under observation as compared to 1,106 last year. As long as new cases of positive trachoma continue to register at the clinics, it will be evident that the disease is not controlled. In the past year 191 operations have been performed in the clinics and the total attendance to date has been 38,217. Of course, it will be understood that many people who come to the clinics for diagnosis do not have trachoma, but suffer from other eye conditions which are a threat to their vision. These people are given a complete examination and are diagnosed. They are referred either to a local eye physician for treatment or to the Illinois Eye and Ear Infirmary for care. During the past year an effort has been made by the Illinois Society for the Prevention of Blindness to make definite provision for these cases. If they were not able to pay for medical care, they have been sent to the Infirmary for treatment or operation. Eighty-eight such cases have been sent up to the Infirmary this year. Arrangements for 24 more cases are pending until beds are available at the Infirmary. This is a pleasant by-product of the

trachoma work. During the year, those in charge have carefully noted the condition of the eyes of new positive cases reporting to the clinics for diagnosis and treatment. There were 331 such cases in the last 12 months. Of this number:

33 were in Stage I (beginning trachoma)
55 were in Stage II
66 were in Stage III
177 were in Stage IV

"Work with trachoma cannot be abated until the time comes when there are no more cases of fresh trachoma (Stage I) reporting to the clinics. It is interesting to note that of the 33 fresh cases reporting this past year:

8 were less than 10 years of age
11 were from 10 to 20 years of age
7 were from 20 to 30 years of age
2 were from 30 to 40 years of age
5 were from 40 to 50 years of age.

The preponderance of new cases will be seen to occur in the younger people. Cognizance of the fact that gradually trachoma is coming under control is shown by the fact that the budget for the clinics was cut considerably.

"Visitors from several other states have been entertained at the clinics during the year. One public health official from West Virginia visited the Illinois unit for ideas for the West Virginia trachoma control and sent his nurse to the Illinois clinics for training. The trachoma staff have held monthly meetings at which various ocular problems have been presented by experts in the field. The staff remains intact, and this continuity shows in the splendid quality of the work, in smooth efficiency, and in the confidence and satisfaction of the patients. Governor Horner, who made this work possible by the original grant in 1934, should feel deep satisfaction at the great humanitarian work that has grown out of his interest in the prevention of blindness."

—*Illinois Society for the Prevention of Blindness, Chicago, Illinois*

Indiana

"At a meeting in Indianapolis on Sunday, November 12, 1939, representatives from the Public Welfare Department, Indiana Academy of Ophthalmology, Board of Health, and the Indiana State Medical Society considered proposals for an active campaign against trachoma, which accounts for ten per cent of Indiana's

blindness. The state supervising ophthalmologist, Dr. C. W. Rutherford, gave a summary of the sulfanilamide treatment of trachoma patients who have been cared for by the Blind Assistance Division of the Public Welfare Department. A discussion of mobile units, health units, local periodic trachoma clinics, and other methods for management of this disease in southern Indiana was considered. Each community has local committees on the conservation of vision, chosen by the county medical society, and it was decided directional assistance to these committees should be given to work out a solution of the problem in each county where trachoma is prevalent."

—*Indiana State Medical Association, South Bend, Indiana*

Kansas

"The sight-saving movement is now taking root in Kansas. Wichita now has a class which is in its third year, and other cities are organizing, through co-operation with the state, similar classes. Miss Florence Folks, who finished her sight-saving course at Western Reserve University at Cleveland last summer, is now finishing her A.B. course at State Teachers College at Emporia, Kansas. Upon completion of her collegiate work, she will teach a sight-saving class at Ashland, Kansas. Miss Nellie R. Oldham, who also took the sight-saving work at Western Reserve, is to be assigned to a sight-saving class which is now in its inception at Winfield, Kansas. Pittsburg, Hutchinson and Salina are now making surveys preparatory to establishing sight-saving classes. Miss Elizabeth Snyder, school nurse at Salina, has found that at least ten pupils are in need of sight-saving class attention. However, the class has not yet opened because the state feels that a suitable room has not been selected by the Salina Board of Education. As soon as a room has been found, Salina will be the next city to have a sight-saving class.

"From all indications Kansas should have, by the end of the year, at least six or seven sight-saving classes in operation. With a population of less than two million, this should be considered a progressive step by the Sunflower State."

—*Kansas Society for the Prevention of Blindness, Wichita, Kansas*

Louisiana

"For the past quarter, we have been looking over our program of activities with a view to determining what course seems to be best suited for our future work by the experience through which we have just come, and for the purpose of seeing which activities seem best suited to different sections of our state.

"In the past, much emphasis has been given to the importance of publicity, for we believe that this is an important factor in the proper expansion of our work. Our publicity chairman has secured through the press excellent releases which have apparently attained their purpose, for there is more general recognition on the part of organizations of the importance of *sight conservation.* We have used other media of public education, and many groups have shown great enthusiasm in our program and have signified their intention of helping us. We have offered them the resources of our organization for their work in this direction. Several students of social work have come to us for literature on the subject of prevention of blindness for preparation in writing their theses. They have been given access to information and knowledge on the subject.

"We feel that the acquisition of new members during the year has been partly a result of our publicity campaign. There is no denying that we have made much progress in our program during the year, and we are grateful to our more generous citizens who made this progress possible. We believe it is imperative to continue our membership campaign and that this phase of our work should have a very definite part in our future program to further create and hold the interest of the public. An outstanding and important activity has been our campaign to alleviate an epidemic of 'sore eyes' among the school children of a rural district. This epidemic, which has occurred spasmodically for the past few months, has constituted a serious problem. On investigation we found that the attendance in one school had dropped more than 25 per cent as a result of this epidemic. We have been able to help solve this problem, for one of our chairmen, an oculist, at our request, visited the parish and took cultural tests for determining the nature of the disease. He diagnosed the condition as that of a severe type of Koch-Weeks infection and prescribed a course of treatment for each patient. A recent check-up shows that the results have been splendid. This physician will continue to visit the patients at frequent intervals until such time as the epidemic has subsided. We can point with justifiable pride to the fact that we have received such enthusiastic co-operation from our chairman. This re-awakens us to the realization that much good can be accomplished by further organizing branches throughout the state, for we believe these branches offer us exceptional possibilities for spreading our work. Some of our active chairmen are oculists and we have left the responsibility for the management of branch organizations up to them. They have adopted policies, which met with our approval, for such functioning of their branches as seemed best suited to their particular communities.

"We are ever mindful of the importance and urgent necessity

of conserving the eyesight of our school children. We have been responsible for more than 300 school children receiving eye care during the past three months, and of this number more than 100 were furnished with lenses gratis by our Society. In our work among the school children we have discovered that there is an acute need for teaching parents the common-sense fundamentals of sight conservation, and in this connection we have arranged talks before many parent groups in our state. We have reason to believe these messages are far-reaching, for inquiries pertaining to this subject come to us from many sections. We have put much stress on the fact that the entire program must be treated as educational and not as welfare work. Proper lighting in the classroom is a primary point in our campaign for better sight, and we are constantly working for correct equipment and proper arrangement.

"Many organizations in the state have done good work in helping our Society promote proper corrections of eye defects found by clinical tests. This particular type of service to our children is invaluable, especially to indigent children who are suffering from eye difficulties. We have carefully planned programs for these groups and have closely supervised their work. We arranged and supervised an eye clinic recently conducted in a rural section of our state. More than 400 school children were given preliminary eye tests and of this number more than 75 were suffering with eye difficulties. One of our co-operating agencies assumed the responsibility for a definite follow-up plan, and their duty will be to contact the parents in an effort to have necessary corrections made. In cases where children cannot afford the services of an oculist, arrangements are being made for clinical care. With a limited personnel it has not been possible for our organization to do this work unassisted. We believe the future success of this program will depend primarily on the co-operation we receive from affiliated agencies and our branch organizations. It cannot be pointed out too strongly that there is urgent need for a nurse on our staff to do follow-up work, and we are hoping in the not too distant future to add one.

"With this cursory review of the high points of our program, we believe our future course is charted along the lines mentioned above, for we know beyond fear of contradiction that we are doing much to save sight in Louisiana."

—Louisiana Society for the Prevention of Blindness,
New Orleans, Louisiana

New Hampshire

"The Division of Maternal and Child Health of the State Board of Health has added to its free educational material two leaflets on sight conservation which are being distributed to the mothers of

the state. The leaflets are: Behaviors That May Indicate Eye Difficulties, and To the Mothers of Children with Crossed Eyes. Both leaflets are issued by the Department of Public Welfare.

"The Laboratory of Hygiene of the State Board of Health has available at all times to the physicians of the state a supply of silver nitrate."

—*State Board of Health, Concord, New Hampshire*

Pennsylvania

"The Medical Society of the State of Pennsylvania has expressed a continuance of its interest in sight saving by re-appointing the Committee on Conservation of Vision for the year 1939–1940 with the following personnel:

Samuel Horton Brown, M.D., Philadelphia, Pa.
John B. McMurray, M.D., Washington, Pa.
Lloyd C. Pierce, M.D., Harrisburg, Pa.

"The Eye Section of the Philadelphia County Medical Society has inaugurated a series of monthly postgraduate sessions covering all phases of ophthalmology for the session 1939–1940, and report the issuance of over 1,600 registration cards for the series, showing a remarkable uptake in the interest shown in topics concerning sight and the eyes."

—*The Medical Society of the State of Pennsylvania, Philadelphia, Penna.*

South Carolina

"The State of South Carolina had had no law making it mandatory to put a prophylactic in the eyes of newborn infants, thus preventing blindness from ophthalmia neonatorum which is one of the greatest causes of blindness in the state. This legislation was passed by the General Assembly in June, 1939. Our Division participated in the passage of this bill, and several months prior to the meeting of the General Assembly we secured the approval of such legislation from the State Medical Association, the State Ophthalmological Society, the State Association of Nurses, and the Lions International . . . . In recent months, our Division has also co-operated with the Division of Public Assistance in the matter of studying their medical records on approved cases. As these cases have been studied, there has been indicated on each record the treatment which had previously been recommended by the examining ophthalmologist, and these were flagged in order that the Division of Finance might be in position to interpret the medical

records to each county following such procedure as the examining ophthalmologist has recommended. We have also assisted this department in requesting reports from the counties on follow-up. In many of those cases which were serviced, while the examining ophthalmologist had recommended an operation and the supervising ophthalmologist had approved the same, there had been no plan sent in from the county for treatment. These cases have also been flagged in order that follow-up might be instituted . . . .

"The department arranged for three lectures to be held at Winthrop College during the summer session. These were conducted by an ophthalmologist. Winthrop is one of the largest colleges for women in the south and the largest one in South Carolina, and because of the fact that more teachers do their summer work there we felt it a wise selection for inaugurating this type of education. We trust to have this in other colleges very soon. About 500 students attended these lectures and their reaction to them was very encouraging.

"Since June 30, 1939, six screening clinics have been conducted. About 896 persons attended these clinics. There has also been one treatment clinic at which 27 children received treatment. A matter of interest regarding these is the fact that six of these children had seriously defective vision as result of vitamin deficiency. These were referred to their local County Department of Public Welfare with the suggestion that they co-operate with the home demonstration agent in working out correct diets. It was also suggested that they secure cod liver oil, which will be bought locally. Another effort which was made to assist these children, who all come from indigent families, was to request that they receive hot lunches at school wherever possible.

"Two field meetings were held at which talks were given to Department of Public Welfare social workers of six counties. The talks were on social implications of blindness and defective vision. At these meetings also was given the technique of taking visual acuity, and we feel that this is information that all county workers should have. As result of this, the State Department has secured Snellen charts for every County Department of Public Welfare. Similar meetings to the one just referred to will be held in all parts of the state within the coming months."

—*State Department of Public Welfare, Columbia, South Carolina*

Tennessee

"*Sight Conservation Activities.*—On August 22, the Prevention of Blindness Division was officially transferred from the Department of Institutions into the Department of Public Health, and it was

decided that in the future it would be known as the Sight Conservation Service. Since July 1, the Sight Conservation Service has had sight restored in 34 cases, of which five were of bilateral pterygia, the remaining 29 being restorations by glasses. Out of this latter group, 23 were children and six adults, and of these 18 are being prevented from going blind from amblyopia exanopsia in either one or both eyes. Two adults have been prevented by surgery from going blind, one being prevented from going blind by sympathetic disease by the enucleation of an injured eye, the other being prevented from going blind by the transplantation of a pterygium in each eye. One child has been prevented from going blind from trachoma by treatment with sulfanilamide. During this period two Lions Clubs have begun programs among the visually handicapped children in their counties—following the lead of the Lions Club of Gallatin, Tennessee, which began its work with visually handicapped children in April of this year. These Lions Clubs are those of Waverly, which is in Humphreys County, and of Centerville, which is in Hickman County. The Gallatin Lions Club, since it started its work, has brought in 22 children and furnished them with glasses, which are preventing blindness from amblyopia exanopsia in 16 of these cases. The Waverly Lions Club has brought in two children who are being prevented from going blind in one eye each, by glasses, from amblyopia exanopsia; and the Centerville Lions Club expects to bring seven children this month.

"Our first sight-saving class, which was established in the Eakins Public School of Nashville, in September, 1938, is taking care of 14 visually handicapped children this year. In September of this year another class was established at the Tennessee School for the Blind, caring for children in the first three grades, which has an enrollment of 12. The Nashville public school system is planning to establish another sight-saving class in January of 1940 to care for visually handicapped children above the sixth grade, the teacher for this class having been trained this summer at Cleveland, Ohio.

"The talking slide film on the nurse's contribution in the prevention of blindness has been shown before three groups, two being parent-teacher associations and one being a health group, reaching approximately 100 persons. The director of the Sight Conservation Service has given five talks on the causes of blindness prevalent in Tennessee and their prevention before various groups reaching approximately 150 persons. The survey of the blind of the state, which is being conducted by the Sight Conservation Service, is going forward rapidly and is now approximately 60 per cent completed. Two thousand, one hundred cases of blindness have been surveyed, and this survey so far reveals that 65 per cent of this blindness could or might have been prevented, and that 54 per cent

of this group have a chance, varying from an excellent one to an outside chance, to have their sight restored, in whole or in part, in either one or both eyes."

—*Sight Conservation Service, Department of Public Health, Nashville, Tennessee*

Washington

"To carry on the program of prevention in the field of blindness, Miss Ruth Douglass, medical social worker, has been added to the staff of the Division for the Blind. Miss Douglass joined the staff as of October 1, 1939, to pick up the activities which had been carried on by Mrs. Iva Jankelson since June, 1937. Mrs. Jankelson left the department on September 1 to attend Washington University in St. Louis for study in the field of medical social work. Miss Douglass, who has recently been doing graduate work at the University of Chicago, brings to the Division a wealth of experience in the field of prevention of blindness and conservation of vision. With departmental activities getting well under way during the new biennium which began in April, 1939, the Division for the Blind is busy reviewing its activities and making plans for the coming year. Such plans include the development of its program of vocational rehabilitation and prevention, as well as assistance to needy blind persons."

—*Division for the Blind, State Department of Social Security, Olympia, Washington*

Note and Comment

Eye Health Institute.—The National Society for the Prevention of Blindness again offers an eye health institute, February 26–March 21, under the direction of Miss Elizabeth G. Gardiner, medical social worker of its staff. Lectures will be given by Dr. Willis S. Knighton—senior assistant surgeon of the New York Eye and Ear Infirmary, and instructor of undergraduates, New York University Medical College—and members of the Society's staff. No tuition is charged, and a list of relatively inexpensive living quarters will be furnished. For application blanks and further information, address the National Society for the Prevention of Blindness, Inc., 50 West 50th Street, New York, N. Y.

National Social Hygiene Day.—During the week beginning Thursday, February 1, 1940, the country will observe its fourth National Social Hygiene Day, designed to inspire concerted action by organized groups and private individuals to ring the death knell of syphilis. The National Society for the Prevention of Blindness will take active part in this observance, maintaining an educational exhibit at the regional conference in New York City February 7. National agencies, state organizations, community clubs, and committees representing awakened members of the general public in every walk of life will review the progress made in the relentless war which recent years have brought into the open and fought with the aggressive weapons of press and radio publicity, enlightened medical advances, legislation, law enforcement, and increased public understanding. Only a few years ago prudery forbade open reference to syphilis and gonorrhea, and even today syphilis is still a major threat to the health of the nation. The fourth National Social Hygiene Day will be observed as a day on which to appraise and publicize the gains effected in the eradication of an ancient scourge, and to enlist the nation's enthusiastic and wholehearted co-operation in demolishing outworn taboos, raising present health standards, and enriching the health heritage of future generations.

Contact Lenses Make Their Début in the "Movies."—A Metro-Goldwyn-Mayer murder mystery film with comedy touches, "Miracles for Sale," starring Mr. Robert Young, has introduced the contact lens to millions of movie-goers in a highly dramatic if perhaps misleading manner. Mr. Henry Hull, as one of a group of professional magicians, among whose number several murders occur, confuses cast and theater patrons alike by appearing alternately as his characteristic self and as one of the victims, in assuming whose guise he must undergo a complete transformation. When a ruse to trap the murderer proves successful, it is shown that he "changed the color of his eyes" by the use of contact lenses which appear, when examined by the police, to be glass shells on which a blue-tinted iris surrounds a circular hole sufficiently large to permit the actor to peer, as through the slits in a mask. The technique of removal of contact lenses is demonstrated as the murderer gives up his disguise. Incidentally, no reference is made in connection with the use of the so-called "new invisible spectacles," which would indicate their proper use and function.

Courses in Ophthalmology at George Washington University School of Medicine.—An announcement received from the George Washington University School of Medicine, Washington, D. C., gives details of a week's intensive postgraduate course in ophthalmology, to be held from March 25–30 inclusive. In addition to lectures by staff specialists, the course will feature a considerable number of distinguished guest lecturers. A special five-day practical course in ocular surgery, pathology and orthoptics, to be conducted by the resident staff of the department of pathology of the University School of Medicine and the Army Medical Museum, is scheduled for the dates of March 19–23 inclusive.

The Eyes as a Gauge of General Nutrition.—In a recent issue of *The American Journal of the Medical Sciences*, Tom D. Spies, M.D., who contributes, "A Note on the Ocular Symptoms Occurring from Malnutrition in Human Beings," states: ". . . Fifty patients (suffering from pellagra, beriberi and riboflavin deficiency) . . . had or developed ocular manifestations, characterized by severe burning, itching and excessive dryness of the

eyes. Oftentimes the patients describe a 'scum' over their eyes and state that the eyes hurt when they go into sunlight. There is granulation and extreme redness of the conjunctiva, particularly of the lower lids, and a striking degree of photophobia . . . These lesions appear, irrespective of whether the deficiency developed as the result of an inadequate food intake due to economic factors or to chronic alcoholic addiction, or as the result of organic diseases which interfered with adequate nutrition. Unpublished observations on 70 unselected cases in the nutrition clinic, 20 of whom were children, showed a striking deficiency of vitamin A in the diets of 65 cases. Following the daily administration of vitamin A, in the form of carotene in oil or as oleum percomorphum, in amounts ranging from 10,000 to 50,000 units, these patients were able to read better, the burning ceased, and the conjunctivitis and photophobia disappeared. Following this therapy there has been, so far, little if any improvement in the dizziness, nystagmus, and dilated pupils, but the patients have reported an increase in strength and feeling of well-being . . ."

Sweets for the Eyes of High Flyers.—Lowered oxygen pressure has been discovered to have a marked effect upon the adaptation of the human eye to dark and light, but may be counteracted by a dose of glucose. Therefore it is not unlikely that emergency rations of sweets may presently be issued to bombing plane pilots cruising at high altitudes, as an aid to accurate reading of brilliantly illuminated instruments in planes flying over blacked-out areas.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

309. The Radio and the Talking Book in Sight-Saving Classes, Olive S. Peck. 12 p. 10 cts. Cleveland's experience in arranging radio and talking book instruction for elementary school sight conservation classes. Reprinted from *The Sight-Saving Class Exchange,* November, 1939.

310. Theory of Handwork in the Sight-Saving Class, Ada Burress. 8 p. 5 cts. The author presents a study of manual and artistic development in young children through selected and guided handwork projects. Reprinted from *The Sight-Saving Class Exchange,* November, 1939.

311. Work Units for Sight-Saving Classes, Io Starr. 24 p. 15 cts. Lists scores of handwork units, with recipes and full directions, to be undertaken by sight-saving class groups. Reprinted from *The Sight-Saving Class Exchange,* November, 1939. (Original title: "Problems, Recipes and Directions.")

312. Motivated Handwork and Activity Units in Sight-Saving Classes, Sarah Latimer Phelps. 16 p. 10 cts. The author suggests and describes handwork units related to other studies and to group activities in particular. A long list of helpful texts is appended. Reprinted from *The Sight-Saving Class Exchange,* November, 1939.

313. A Survey of Illumination in Selected College Buildings, Louis M. Hickernell, M.D. 20 p. 15 cts. Discusses lighting conditions in study rooms, libraries, laboratories and classrooms, and presents practical recommendations for lighting standards.

314. Trachoma Control in the Indian Service, J. G. Townsend, M.D. 12 p. 10 cts. A dramatic account of the use of sulfanilamide in the control of trachoma among the American Indians.

315. The Rôle of Health Departments in the Prevention of Blindness, John L. Rice, M.D. 8 p. 5 cts. Discusses what the various bureaus and divisions of the New York City Health Department are doing to help sight conservation.

316. Readability of Stencil-Duplicated Materials, Matthew Luckiesh and Frank K. Moss. 12 p. 10 cts. Emphasizes the need for securing the best stencil-duplicating process to insure highest visibility.

317. Treating Trachoma by Trailer, Ann West. 12 p. 5 cts. A human and informal description of a day's adventures with a mobile treatment unit operating out of Charleston, West Virginia.

318. Sight Conservation Through Fuller Understanding of the Patient, Lena R. Waters, Chairman. A symposium of Annual Conference papers: 1. The Young Child with a Visual Handicap, Helen H. Shaw; 2. The Older Child with Eye Difficulties, Bertha Ross; 3. Children with Temporary Eye Difficulties, Ruth E. Lewis. 28 p. 15 cts. Supplement to Vol. IX, No. 4, of THE SIGHT-SAVING REVIEW, December, 1939.

Contributors to This Issue

Dr. Ira V. Hiscock, a member of the Society's Board of Directors, is Professor of Public Health at the School of Medicine, Yale University.

Dr. Louis M. Hickernell is associated with the College Infirmary, Student Health Service, Syracuse University.

Under the auspices of the United States Department of the Interior, **Dr. J. G. Townsend,** Director of Health, Office of Indian Affairs, has been able to pursue his trachoma studies described in this issue.

Dr. John L. Rice is Commissioner of the New York City Department of Health, and a member of the Society's Board of Directors.

REVIEW readers are well acquainted with the work of **Messrs. Luckiesh** and **Moss.**

Mrs. Helen H. Shaw is on the staff of the Social Service Department of the Children's Hospital, Washington, D. C.

Miss Bertha Ross is on the staff of the Social Service Department of St. Luke's Hospital, New York City.

As assistant professor of medical social work at the George Warren Brown Department of Social Work of Washington University, St. Louis, **Miss Ruth E. Lewis** has taken an active part in the development of medical social eye work.

Erratum.—Mr. Harry O. Page, author of "Prevention of Blindness as Seen by an Interdepartmental Council," appearing in the September, 1939, issue of the REVIEW, and mentioned in our contributors' column on page 248, is Commissioner of Public Welfare of the State of New Hampshire.

Index—Sight-Saving Review

Volume IX: 1939